OUISIANA CONSERVATION REVIEW

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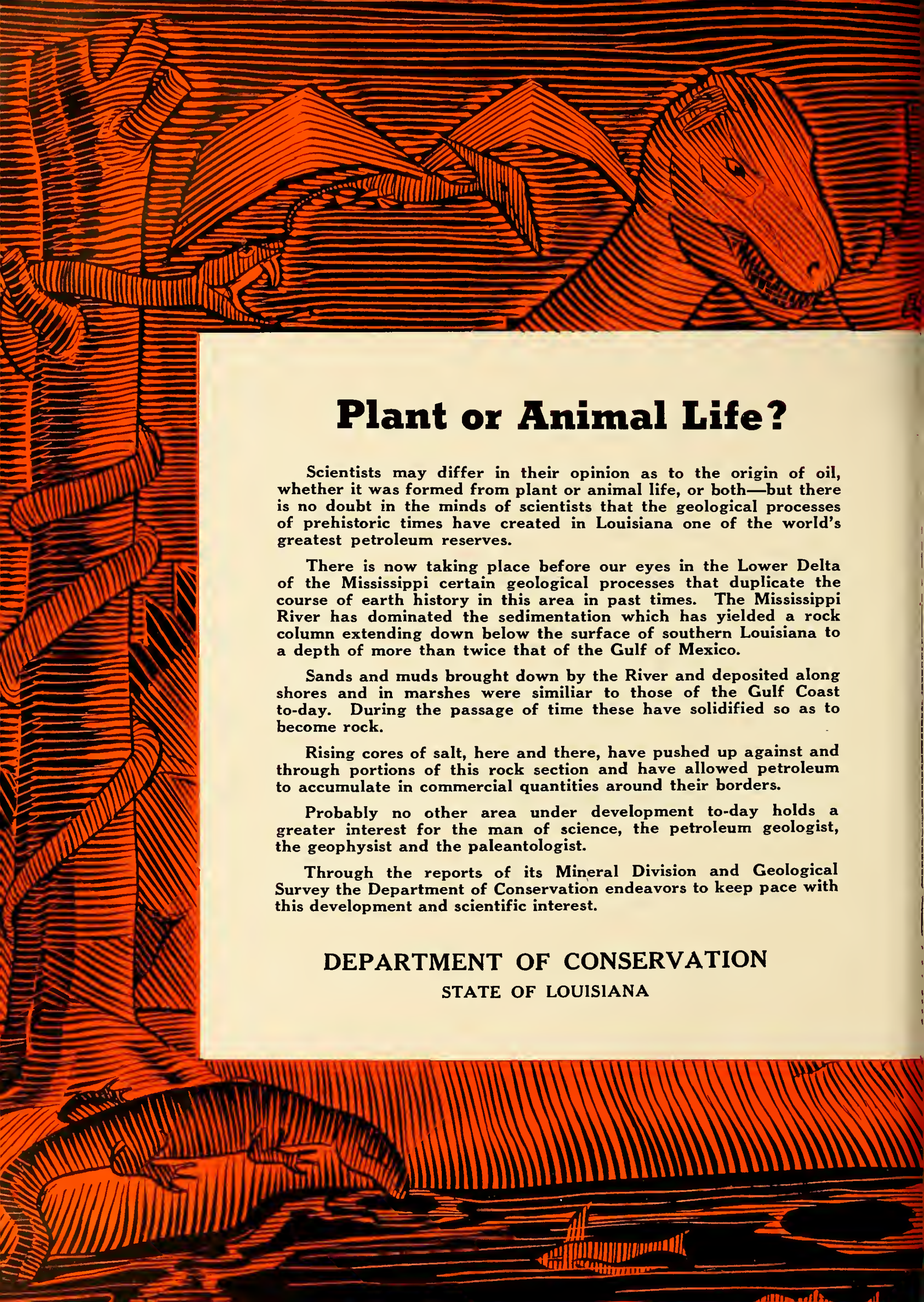

Plant or Animal Life?

Scientists may differ in their opinion as to the origin of oil, whether it was formed from plant or animal life, or both—but there is no doubt in the minds of scientists that the geological processes of prehistoric times have created in Louisiana one of the world's greatest petroleum reserves.

There is now taking place before our eyes in the Lower Delta of the Mississippi certain geological processes that duplicate the course of earth history in this area in past times. The Mississippi River has dominated the sedimentation which has yielded a rock column extending down below the surface of southern Louisiana to a depth of more than twice that of the Gulf of Mexico.

Sands and muds brought down by the River and deposited along shores and in marshes were similiar to those of the Gulf Coast to-day. During the passage of time these have solidified so as to become rock.

Rising cores of salt, here and there, have pushed up against and through portions of this rock section and have allowed petroleum to accumulate in commercial quantities around their borders.

Probably no other area under development to-day holds a greater interest for the man of science, the petroleum geologist, the geophysist and the paleantologist.

Through the reports of its Mineral Division and Geological Survey the Department of Conservation endeavors to keep pace with this development and scientific interest.

DEPARTMENT OF CONSERVATION
STATE OF LOUISIANA

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EDITORIAL

THE PHOTOGRAPHER LOOKS AT "LOVELY LOUISIANA"

We wish to direct the attention of our readers to the series of photographic studies by Delcroix in this issue of the Review. While these are scenes of rare charm and artistic distinction, their chief value resides in their suggestion of the infinite variety of Louisiana's natural scenery.

It is true that the other states of the American Union have their points of scenic beauty, but none of them surpass Louisiana's exhibit of wildlife, of flora and fauna that intrigue the interest of the nature-lover, whether in woodland dell of North Louisiana or semi-tropic swamp of South Louisiana.

In the complex society of our mechanical civilization the conservationist stands guard over these treasures that Nature has bestowed in such generous measure on the people of Louisiana.

WILDLIFE CONSERVATION BY C. C. C. BOYS

No Federal project has enjoyed more widespread appreciation than the work of the Civilian Conservation Corps. This is readily explained by the practical accomplishments of the enrollees as well as the disciplinary influence on the character and morale of our youth at this impressionistic period.

Five of the 27 C.C.C. camps in this State have been under the direct supervision of the forestry division of this Department, two under the State Parks Commission; but Louisiana has gone further than this in its recognition of the outstanding benefits to the State as well as to the boys themselves of the C.C.C. program.

Louisiana was one of the first states to fulfill its obligations to the Federal government in connection with the Forestry C.C.C. camps, $200,000 a year being appropriated by the Legislature at its last session for the maintenance of improvements made by the enrollees in this State during the past five years.

The State is a direct beneficiary of the C.C.C. program, probably the chief benefit being the physical and educational advancement of the boys themselves. As the result of a balanced diet and outdoor exercise the boys have gained from five to sixty pounds in weight, depending on their initial condition; and most of them have advanced several grades in their studies.

CONSERVATION OF WILDLIFE RESOURCES

At the hearings before the select committee on the conservation of wildlife resources of the House of Representatives, third session of the seventy-fifth Congress, Granville E. Dickey, chief statistician of C.C.C., testified that the activities of enrollees have given the greatest practical impetus to the conservation, preservation and increase in our wildlife resources that the nation has ever experienced.

Since the beginning of the present fiscal year 2,132 C.C.C. camps or work groups have been in operation at one time or another. On an average about 1,610 barrack camps and 70 Indian work camps will be operated in the continental United States during the fiscal year 1938. This will have furnished employment to an average of close to 300,000 enrollees.

The Conservation Review is furnished free on request to citizens of Louisiana, to public schools, libraries and scientific institutions in the United States and foreign countries. Of this issue 27,000 copies are distributed.

The C.C.C. boys have constructed dikes, dams and other water-control structures to stablize water levels and to store water. Stabilizing the level of shallow fresh-water areas has permitted the growth of aquatic and other vegetation that will furnish food for birds. Storage helps to maintain a continuous supply of water in the drier areas, especially in the important waterfowl-nesting regions of the Northwest. Springs and wells have also been developed.

Where food plants for waterfowl were lacking, C.C.C. enrollees have planted them. They have collected seeds and tubers where the plants are abundant and stored them for planting at the right time. The plantings have also included shrubs and trees and field crops that are left for the waterfowl and upland game birds.

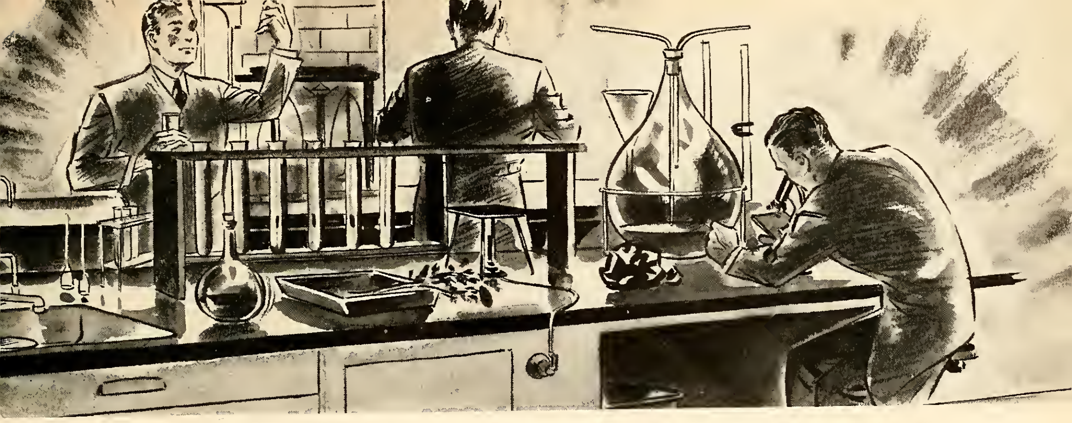
Nesting islands have been built in some cases. Fences have been erected to protect wildlife food and cover from destruction by stock. Erosion control has been carried on to prevent silting of waterfowl ponds and to protect the ranges of big game animals.

All of these activities will make these areas into better habitat for birds. Other work by C.C.C. camps is directed towards the same end by making it possible for the refuge supervisor to protect birds more efficiently. Truck trails, fire lanes, lookout towers and service buildings have been constructed to promote efficient operation of the refuges.

The C.C.C. camps have also been invaluable wildlife relief agencies in times of emergency. When drought threatened the birds, boys from the camps helped in gathering them from dried-up areas and releasing them on refuges where the water supply had been conserved. During severe winter weather the boys also helped the birds out by emergency winter-feeding activities.

All these developments are promoting the greatest feeling of encouragement that practical American wildlife conservationists have ever known.

Other C.C.C. jobs include stream development, surveys and a great variety of related wildlife tasks. Practically all of the efforts of the C.C.C. camps under the technical supervision of the U. S. Biological Survey are strictly pointed towards preservation and increase of our wildlife resources.



RESEARCH WILL REWARD US

By

WILLIAM G. RANKIN

COMMISSIONER OF CONSERVATION

Napoleon is credited with the saying that an army fights on its stomach—what he meant, no doubt, was that the strength of an army was no greater than its commissary.

In the case of our economic war, which is always going on, I think Napoleon's dictum should be modified by saying that research comes ahead of the commissary and the stomach; that research is the advance guard of industry, that it insures the knowledge which forearms us with the implements of war.

We are all familiar with the notable contributions of science to the progress of civilization—the inventive genius of Bell and Edison and Marconi—I will leave to the imagination of Mr. H. G. Wells to picture the future of our mechanical age.

Bringing this thought nearer home, I have felt from the beginning of my administration as Commissioner of Conservation that the most important work of the Department would be along the lines of research which would point the way to a solution of our problems; that the supervision of our wildlife and natural resources, the enforcement of our conservation laws, the collection of our license monies, would be the background or support of our experimental work and the findings of our laboratories.

RECOGNITION OF RESEARCH VALUES BY LEGISLATURE

Realizing that in our great State University we have a nucleus of research workers and investigators, serious-minded students, it occurred to us that the Department should be provided with its own building and laboratory equipment on the University grounds. With the Governor's endorsement I made this my most urgent petition to the Legislature at its last session, and the result was an appropriation of $350,000 for a building in which to house our Geological Survey and Research Division, which will dig into the complex problems of our Department.

To appreciate the possibilities of such research work it is only necessary to recall that the geological reports of Dr. Russell and Dr. Howe, published in the bulletins of our Department, were primarily responsible for the interest that is now being taken by the major companies in Louisiana oil exploration and production.

With the deeper drilling that is taking place throughout South Louisiana, we now have an opportunity to examine earth corings never studied by man before, to confirm or reject some of the scientific theories that came out of the laboratories of our pioneer geologists and paleantologists. It is necessary that we revise the previous estimates of our petroleum reserves, that we make a more intensive study of this infant prodigy that has appeared so suddenly on our door-steps.

THE INSPIRATION OF DR. HERTY'S WORK

At this point I would like to pay tribute to the late Dr. Charles H. Herty, whose work should be an inspiration to all of our scientists and research workers.

In his paper laboratory at Savannah, Ga., Dr. Herty conclusively demonstrated the feasibility of making newsprint and bookpaper in commercial quantities from Southern woods. In the long leaf pine region of East Louisiana and Mississippi, within 30 to 250 miles of New Orleans, there are approximately 37,000,000 cords of wood suitable for the manufacture of paper.

Thanks to the vision of our early-day conservationists, and their demonstration of the practicability of reforestation, Louisiana is now producing second-growth timber faster than it is cut. Science will surely point the way to new uses for this timber to serve as the raw material for new industries.

THAT VEXATIOUS POLLUTION PROBLEM

At this time we are engaged in research work to find some solution for the vexatious problem of pollution, which has lifted its grisly head in several fields within the province of this Department.

The pollution of our fishing waters by waste from industrial plants has not only agitated the anglers and commercial fishermen as well as the farmers of various sections of our State but has posed a problem of serious import to our engineers and chemists and biologists.

Only in rare instances was it a case of willful negligence on the part of the plant management, and taking into consideration the interests of all concerned, the community of workers on the plant payroll as well as the protesting interests, we did not feel justified in taking any drastic action that might tend to cripple industry or retard the industrial campaign inaugurated by Governor Leche.

But we did set to work with our research men, in field and laboratory, trying to evolve a constructive solution that would free our waters from contamination and at the same time not prove too onerous a burden on the industrial plant.

In this direction we have had some experience in the protection of our oyster beds from the contamination of oil drilling operations, through the installation of special paraphenalia by the operators, although the source of the contamination has not been clearly established; and we have also been successful in securing the adoption of subsurface disposal wells by many of our oil producers, to take care of the large quantities of salt water that often accompany the flow of crude oil.

OUR ANGLERS ARE QUITE ARTICULATE

If anyone imagines that we have not been disturbed by this pollution of our fishing waters, they under-estimate the vocal powers of our fishermen, both amateur and professional. Off-hand I should say that Louisiana leads all other states of the American Union in the number and variety of its fishing waters, and in no other state is the sport taken more seriously. Over 12,000 anglers pay a license to use the rod and reel in Louisiana. There is no fee paid by the modest pole fisherman—and his number is legion.

When Mr. Angler finds a fish floating on the surface of his favorite stream, apparently suffering from an over-dose of poisonous food or from lack of oxygen due to a surfeit of waste from the nearby mill—one of those beautiful game fish that might have given Mr. Angler a half hour of excitement and fun—well, I ask you, can we blame him if he becomes articulate enough to be heard throughout the length and breadth of the State of Louisiana?

Having experienced the thrill of game fishing ourselves, we certainly cannot blame him in the least—and yet we do not rush out and order the closing of the offending mill which pays the wages of hundreds of workers. It is a problem for science, for research, and we must cool our heels in patience.

UTILIZATION OF OUR BY-PRODUCTS

Research will render a service of inestimable value through the conservation of our natural resources and the utilization of their waste by-products.

By the new method of hydrogenation developed by the Standard Oil Company at its Baton Rouge plant the production of gasoline from heavy oils can be increased over 100 per cent in volume. This process tends to prolong the life of our oil supply—it also suggests the possibilities for further research work in this great industry.

The chemistry of petroleum derivatives has already indicated new sources of hitherto unavailable industrial chemicals and products—the possibilities offered by such a multitude of available substances may prove even more surprising in the future than in the past.

It is not too much to say that there is no known locality in the world where the natural resources are so combined as to make possible the production of soda, salt cake, sulphuric acid and many other chemicals at so low a cost as in the coastal region of Louisiana.

With practically unlimited supplies of salt and sulphur in the numerous domes, an assured supply of fuel in natural gas, petroleum and lignite, and with unsurpassed transportation facilities, it would appear to be an ideal location for such manufactures.

I can only suggest in this brief outline some of the opportunities for our research workers to point the way to a more profitable utilization of what Nature has bestowed on us in such generous measure.

BUREAU OF CIVIL ENGINEERING ESTABLISHED BY DEPARTMENT

Establishment of a Bureau of Civil Engineering, to handle the surveying, civil engineering and construction projects of the Department of Conservation, is announced by Commissioner William G. Rankin.

Donald E. Fuellhart, petroleum engineer, has been assigned to the new Bureau, as engineer in charge. J. B. Howze, Jr. has been appointed assistant engineer; W. M. Levert, instrument man.

This Bureau will be responsible for existing projects of the Department, i.e.:

(1) Maps or surveys of Department property (involving real estate).

(2) Establishing boundary markers on property.

(3) Filing of deeds or leases of property.

(4) Filing of construction plans.

(5) Original cost data.

(6) Periodic examination and reports of condition.

(7) Descriptive signs of property.

Such projects would embrace the canals and locks at Ostrica and Empire, the dam at O. K. Allen Fish and Game Preserve, fish hatcheries, quail hatcheries, game preserves, Minerals Division office at Rodessa, wharf at New Basin Canal, public hunting grounds, etc.

Among the projects proposed for the new Bureau are the following:

(1) Surveys of dams, including surveys of drainage area, lake area, data for designing dams.

(2) Designs of all types of construction such as dams, docks, roads, bridges, boat houses, etc.

(3) Preparation of plans and specifications to advertise for bids for construction.

(4) Inspection of construction.

This would include such projects as the proposed fish hatchery at Shreveport, Bistineau dam, Turtle Creek dam and other construction projects which may arise from time to time.

THINGS NOT TO FORGET

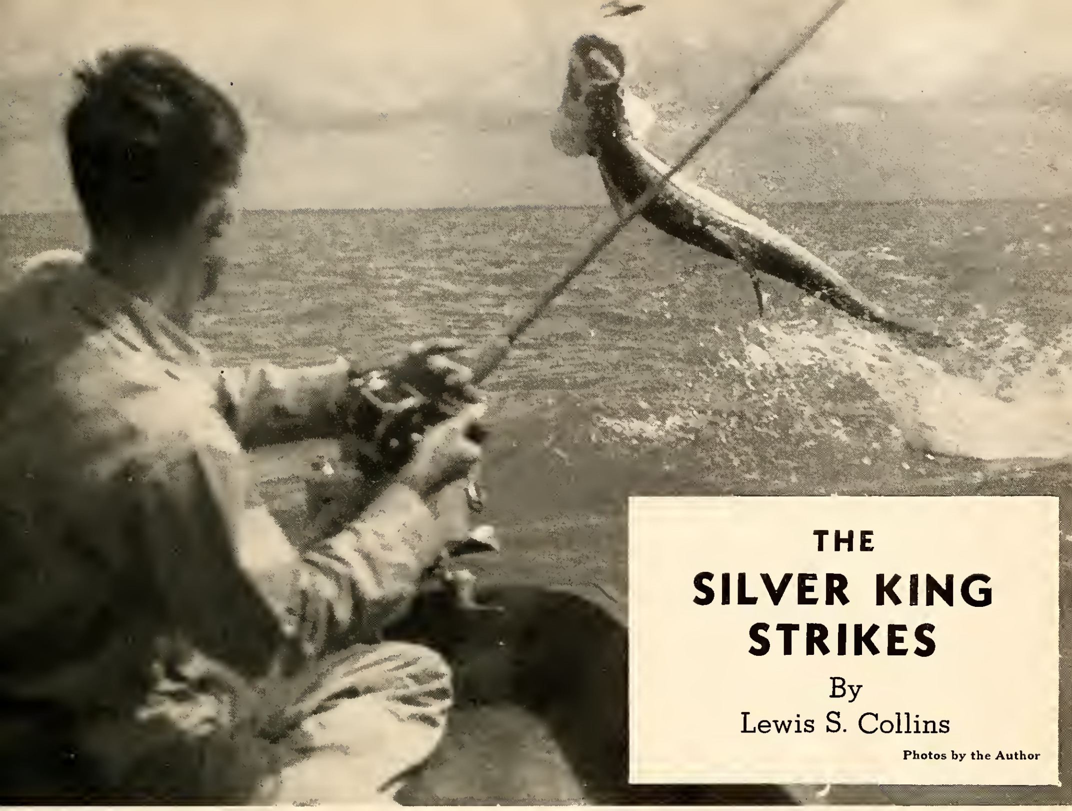
There are many things which a hunter should not forget and they are as important as the gun or license. A hunter should never forget to ask the landholder for permission to hunt on his land. He should not forget to use the gate from one field to the next and, above all, not forget to close the gate. He must not forget to be careful about the farmer's livestock when shooting, for the farmer doesn't like "run aways" in a cornfield and a cow is worth more on the hoof than on the ground. A hunter should not forget to be a gentleman at all times and this means returning to the farmer's house to thank him for the privileges extended and to offer him, if nothing more, a share of the game taken.

Then there are many laws which the hunter must not forget. But these are easy if the hunter will not forget two things. First, some laws are made for the safety of the hunter and the others to save some game for his children. The laws prohibit carrying a loaded or assembled gun in motor vehicle. They also prohibit shooting a rifle across highways or water. Such laws are for the protection and safety of hunters and others. The laws also provide that a hunter may take only so many birds or animals in one day. These bag limits are fixed that a day's hunt will provide plenty for a man's family. To take more is to waste and deprive those who come after us of the sport of hunting.

ACRES AND ACRES

A total of approximately 6,018,560 acres are in research and demonstration areas of the cooperative wildlife research, demonstration and management program of The American Wildlife Institute, Bureau of Biological Survey, land-grant colleges and state conservation commissions.

There are also millions of acres in farm-game management areas which are definitely tied up with this program. For instance, the extension program based on findings at the research unit in the State of Texas alone has put nine million acres into farm-game management areas. This is more land than there is in the entire state of Maryland, an area almost twice as large as the state of New Jersey and more than the combined areas of New Hampshire and Connecticut.



THE SILVER KING STRIKES

By
Lewis S. Collins

Photos by the Author

The little old outboard motor purred steadily, pushing the skiff along beside the railroad trestle. Everything calm, peaceful, then, crash; a reel screeches and forty yards behind the boat, a shimmering silver monster leaps upward against the early morning sky. Away from the bridge as fast as you can, to keep him from the pilings, and the fight becomes serious. Mr. Tarpon really opens up his bag of tricks. A long run with a double somersault at the end, then a quick turn and back at you he comes, leaping again, so close as to shower the boat with spray. Next he sounds, then straight up from the bottom, he again reaches for the sky. The terrific drag of the line and reel at last prove too much for even this tremendous strength and courage. With a last feeble effort he raises half way out of water and then comes slowly and reluctantly to gaff. Gently taking his weight on the gaff, we quickly disengage the hook and with a flip, the game battler is released to regain his spent strength and perhaps thrill another lucky angler.

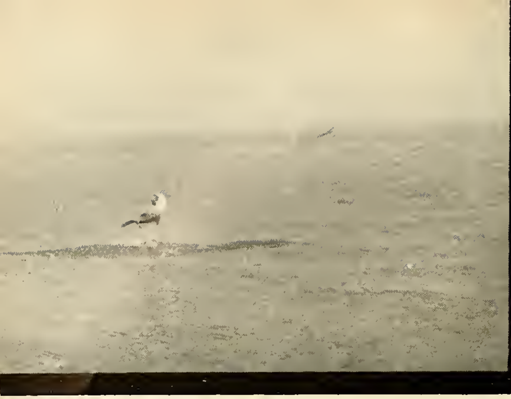
Boca Grande. Aransas Pass. Mexico. Panama. These places are always thought of as meccas of Tarpon fishing. Louisiana should certainly be accorded a ranking place among these sporting paradises. The Tarpon remain in Louisiana at least six or seven months out of the year, and many species of fish are taken all year round. With the rising popularity of the great sport of Tarpon fishing, a number of "Rodeos" have been organized with various prizes offered. Probably the first in Louisiana waters, was the Grande Isle Tarpon Rodeo organized in 1928 by local sportsmen. There were three silver cups given by Hugh Wilkinson, John Donovan, and Alfred Danziger.

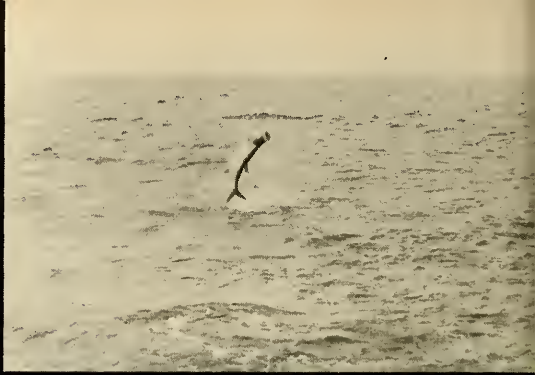
"CITY LIMITS RODEO"

This year, ten years later, the sport has reached its peak. Some thirty beautiful specimens have been brought to gaff within the city limits of New Orleans, one being caught only a few miles from the Southern Yacht Club. The favorite fishing grounds have been Southshore, Chef Menteur, Rigolets, Lake Catherine, and Unknown Pass. Col. Seymour Weiss, prominent New Orleans businessman, announced in August of this year, that he would sponsor a "City Limits Tarpon Rodeo", with a $100 cash prize for the largest Tarpon caught on September 11th, 1938. Mr. Emmett Carriere took the prize with a six foot fish weighing 93 pounds, caught at Southshore. Mr. Weiss has promised to make the "City" Rodeo an annual affair.

Mr. A. B. Patterson and friends made a trip to the mouth of Southwest Pass of the Mississippi river in July and reported large schools of Tarpon and a great catch. This started things. One party after another made the trek to the Gulf and the stories grew. Hermann Deutsch, Edouard Morgan, and the writer arrived on the scene September 17th for two days, and the sight was almost too much. The Tarpon were everywhere and took everything offered. Thirteen were actually landed, several lost in gaffing, and the strikes were innumerable. One week later, Dr. John Pratt and three companions capped the climax with 50 Tarpon landed in one day, and reports that there were fish on top of the water as far as one could see. Mr. H. T. Howard and party came along the next week and hauled in twenty-two silver kings, but reported the sharks playing havoc with hooked fish.

Local sportsmen are busy every day organizing trips and many more of these gamest of fighters will taste the lure before their departure south for the winter. Florida, Texas, Mexico, Etc. may boast, but Louisianians can quietly sit back and catch, or at least hook, Tarpon to their hearts content, right at their own front door.





The Mysterious Tarpon

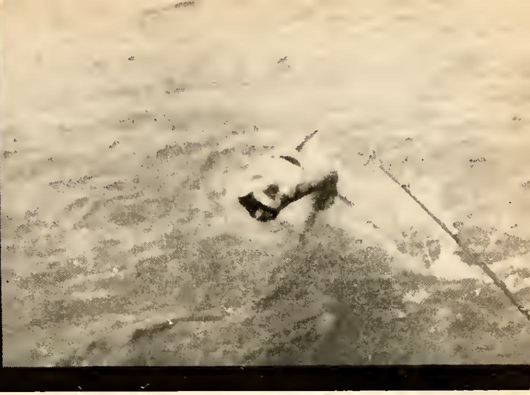
The tarpon is a remarkable, spectacular and famous fish. Furthermore, although known to the scientific world since first described by two Frenchmen, Cuvier and Valenciennes, just 96 years ago, the tarpon still remains very much of a mystery. A hard fighter, well equipped with both speed and power, the tarpon is in reality a gigantic herring, since it belongs to the highly important group, the herring-like fishes, technically known as the **Isospondyli**, or soft-rayed fishes. Its external form strongly suggests a vastly magnified herring. Related to it as members of the same soft-rayed order are such well known fishes as the anchovy, the ladyfish, the ten pounder, the gizzard shad and the tremendously valuable herring of commerce.

The tarpon still remains much of a mystery because important chapters in its life are yet obscure. Itse migrations, its breeding, and its habits remain in large part still far from understood. Most fishes assume their adult form by a slow and progressive series of changes so that from the newly hatched fish larva to the full grown adult development proceeds gradually without abrupt major changes in form. Such, however, is not true in the development of the tarpon, since the tarpon undergoes a startling change from a larval form known as the **leptocephalus,** quite unlike a tarpon in appearance. The **leptocephalus** undergoes a remarkable metamorphosis whereby the growing larva abruptly assumes a form resembling that of the adult. Much of this still remains unclear. The **leptocephalus** of a related East Indian tarpon has been discovered, described and illustrated, and the **leptocephalus** stage of two species, the ladyfish and the ten pounder, have both been studied.

Apparently only two specimens of tarpon **leptocephalus** stage have ever been recorded. The first was described from Cuba by Eigenmann 36 years ago. The second, reported by Hildebrandt, was taken at Beaufort, North Carolina, nine years ago. The **leptocephalus** larva is most peculiar in its appearance and developmental changes. Laterally compressed into a thin vertical ribbon, the **leptocephalus** is so transparent that fine print may be read through its body. So unlike the adult in form is it that early investigators completely failed to associate the **leptocephalus** with the adult form and described them accordingly as distinct species. Another astonishing feature of the **leptocephalus** larva is the fact that when metamorphosis occurs, the **leptocephalus** actually shrinks. In the case of the ladyfish **leptocephalus,** the thin ribbon-like larva, 2¼ inches in length, transformed abruptly into the fish form resembling the adult, shrinking at the same time from 2¼ inches to only an inch in length. This would be comparable to the startling picture of a 4-foot boy suddenly shrinking to two feet in height for the purpose of growing up. The common eel which, as everybody knows, breeds at sea also passes through a **leptocephalus** stage.

12,201,984 EGGS FROM ONE TARPON

Tarpon are extremely prolific as far as their production of eggs is concerned. Louis L. Babcock, the eminent authority on tarpon once caught a six-foot, eight-inch female fish, whose ovaries, filled with immature eggs, weighed 82¾ ounces. Nichols studying this specimen ascertained, on the basis of actually



Peculiarities of Great Game Fish Disclosed by Research of Department of Conservation

counted samples, that there were a computed 163,840 eggs per ounce. Allowing ten per cent for the weight of the membranes of the ovaries, this single fish would contain a total of 12,201,984 eggs. It is reasonable to believe therefore that a large female tarpon carries over ten million eggs. Had every egg of this tarpon developed to attain a size equal to that of the parent, there would have been produced the astounding quantity of 866,340 tons of tarpon. The path to maturity must be indeed a hazardous one from the minute transparent floating egg through the glass-like leptocephalus, less than an inch in length, to the six-foot adult, a veritable giant in comparison.

The record size of tarpon always interests sportsmen. McLaren, at Panuco River, Mexico, back in 1911, caught a seven-foot, eight-inch specimen, 47 inches in girth, that weighed 232 pounds. He used a number 27 thread line. This specimen remained the world's record for 23 years, until Cowden, fishing in the same Mexican river, caught a seven-foot, six-inch tarpon, 46 inches in girth, that weighed 242 pounds. This stands as the world's record fish. Cowden took three hours to land his fish.

Some captures of tarpon on light tackle seem almost unbelievable. John R. Jack, at Boca Grande Pass, caught a 79-pound fish on a steel fly rod with a six-thread line, while James Jordan, of Miami, landed a 13-pound, seven-ounce tarpon, 36¼ inches long, with a 17⅛ inch girth, on number 24 thread, sewing cotton. A tarpon caught on the Florida west coast by Mrs. W. Ashby Jones, just 20 years ago, appears to remain the woman's record for tarpon. It was seven feet, five inches in length, 43½ inches in girth and weighed 210 pounds.

An albino tarpon has been reported and recorded as a fish of especial beauty. Instead of being blue on the back, this specimen was gold, with four or five darker scales. The belly was coral pink, the fine and mouth lemon yellow, the tail whitish, almost transparent, and the eyes showed a pinkish cast.

Henry E. Belden, an eminent fisherman who has written most instructively about the tarpon, has recorded that he found tarpon struck better if the bait was trolled close to the boat at a speed of eight or nine miles an hour. Using a Wilson spoon, he found that although the fish paid no attention to it when it was dragging a hundred or so yards aft of the boat when it was brought close in the tarpon struck. Belden found that crab, which served as excellent bait for tarpon in Florida waters, was valueless in Louisiana. Dr. Charles Haskins Townsend, recently retired as director of the New York Aquarium, has carried out some notable tarpon achievements in Louisiana. Dr. Townsend made the interesting discovery that tarpon appear to be extremely fond of the cutlass fish, **Trichiurus lepturus**, a degenerate member of the mackerel familv. It is a common inhabitant of Louisiana coastal waters.

NO CERTAINTY ABOUT TARPON MIGRATIONS

The migrations of tarpon are still far from clear. It is evident that these fish move offshore during the colder months of the year, and move inshore during the spring and summer. Tarpon appear to be able to live almost indefinitely in

[Turn to Page 57.]

Have You Ever Eaten Muskrat?

By
James Nelson Gowanloch

Have you ever eaten muskrat? If you have not you have missed one of the finest dishes that the whole range of North American game can offer. The writer, in various parts of the continent from Nova Scotia to California and Manitoba to Florida, has eaten the various ducks and geese, ruffed grouse, prairie chicken, woodcock, Jack snipe, the various sandpipers (when they were legal game), bear, deer, moose and buffalo (American bison), but he can make the considered statement that muskrat properly prepared is the peer of any of them.

Muskrats are not really rats at all. It would be just as incorrect to call rabbits rats. In fact, muskrats are more closely related to the rabbits and much more closely related to the squirrels than they are to the objectionable house rat. Their unfortunate name is certainly not deserved but has become so widely used that to almost everyone a muskrat is just a muskrat and nothing else whatever.

Muskrats elsewhere have gained a deserved fame as a delicacy. Designated by such helpful names as "swamp hare" and "swamp rabbit," the muskrat has become an honored dish in some of the finest hotels in Eastern United States. Maryland trappers, for example, find a ready market for all the available supply they can provide in Baltimore where muskrat under its other menu names appears as an expensive and greatly prized dish.

The writer has served muskrat to many fastidious gourmets, none of whom knew at the time the identity of the food they ate. Invariably muskrat fried, stewed or boiled won the highest approbation, the taste being described by many as resembling young marsh hen (clapper rail).

Consider now muskrat as an entree. Muskrat can be prepared in any of the many ways that squirrels or rabbits are prepared. When it is remembered that in a single year over six million muskrats were trapped in the State of Louisiana, it will be realized how vast a potential supply of exceptionally delicious food is almost completely wasted. Trappers themselves eat the muskrats, but it is surprising how few connoisseurs of game, well familiar with the various distinguished methods of the preparation of wild flesh and wild fowl, are utterly ignorant of the delicacy that should of all game be more available in Louisiana than in any other state in the Union.

How is muskrat prepared? Well, the answer is simple. The only difference of treatment from the preparation of rabbit or squirrel is that the two musk glands must be removed. These are two small bodies about one-half and three-quarters of an inch long, readily located on the inside of the thigh of the animal. They should be cut carefully out when the muskrat is dressed. Thereafter, the meat can be treated like any other game. For those who prefer to remove the "wild" taste typical of wild geese, wild ducks and squirrels, just as much as muskrats, a preliminary treatment with vinegar may be used. If the gamey flavor is appreciated, the vinegar treatment may be omitted. The writer prefers the retention of this distinctive wild taste. One recipe very kindly provided by Rosie Lee Mevers is as follows:

What to do with the muskrat carcass? With an annual take of three to six million pelts in Louisiana, disposal of the muskrat's meat after removal of the skin is one of those problems that have baffled the scientific mind for many years. After considerable research the Conservation biologist offers a practical solution, which is—EAT IT!

Muskrats are cleaned, the glands removed and the carcasses disjointed. A pot if half filled with cold water to which is added as seasoning, one tablespoonful of vinegar, one tablespoonful of salt, one pinch of soda, one teaspoonful of sugar, pepper to taste, and the water is brought to a boil. The prepared muskrats are then added and left in this seasoned fluid until the whole mixture again begins to boil. They are then strained in a collendar, rolled in seasoned flour and fried brown. A brown gravy may be prepared since it adds excellently to the taste of the whole dish. Many people also enjoy the substitution of a typical Italian tomato gravy for the brown gravy, but this, in the writer's opinion, tends to mask too much the special flavor of the game.

Muskrat livers are also unusually delicious, equalling the finest chicken livers as an ingredient for various dishes. The writer has also eaten muskrat liver that had been pickled in appropriate solutions and has found it extremely enticing months after it had been preserved. The muskrat meat other than liver can also be very successfully pickled with the various pickling solutions used for the preservation of other meats.

Southern Louisiana is one of the most remarkable trapping areas in the whole North American continent, since from southern Louisiana alone in a single year were taken six million of the total of eight million muskrats produced in the whole country. It is, therefore, readily possible through various arrangements to obtain a taste of this delicious game food. The writer found it easy to negotiate with professional fishermen who gladly agreed to bring in the fresh muskrat meat properly iced down with their fish catches. Transferred to an electric icebox and hard frozen, such muskrat meat remains in excellent condition for weeks and can be used at any time successfully.

Serve some "Marsh Hare". You will find that your guests will demand second and third helpings.

CALDWELL AND WINN PARISHES

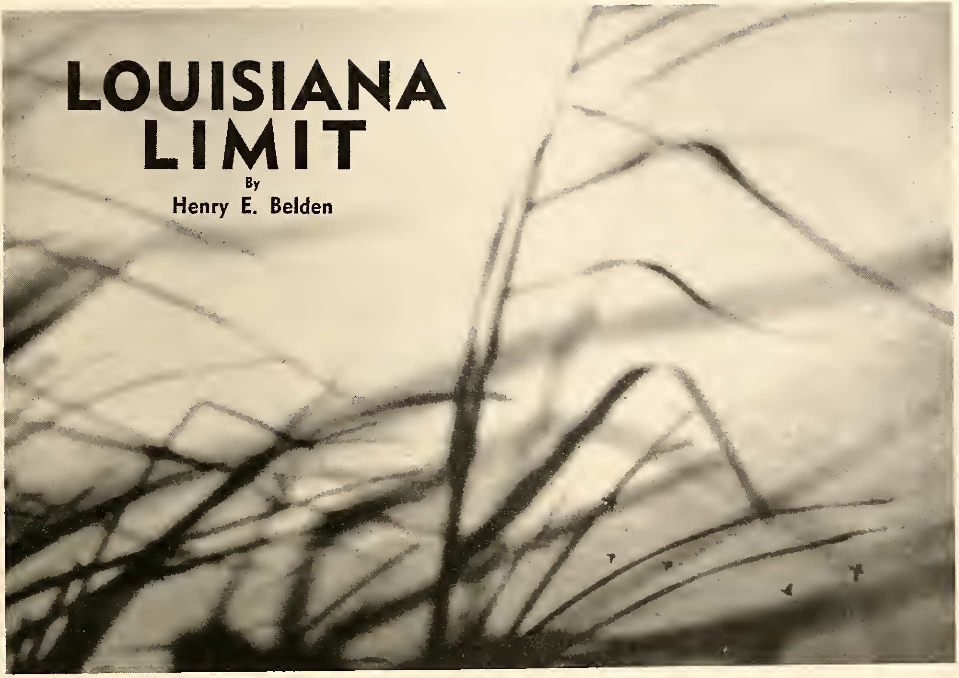
The geological study of Winn and Caldwell Parishes, which has been in progress since June 1, 1936, is being continued. Mr. Huner, the geologist in charge, plans to complete his detailed study of these parishes in 1938.

* * *

The Geological Survey of the Department of Conservation has completed detailed geological and mineral reports on eleven parishes since the survey was reorganized by the Legislature of 1934.

LOUISIANA LIMIT

By
Henry E. Belden



It was winter, but I was covered with perspiration. The pirogue which I was dragging over the marsh no longer seemed a light and narrow boat, but had become a heavy and awkward contraption . . . . I was happy, supremely happy. Never will I forget that day of days, when I played a hunch and won!

I had been hunting with only mediocre success in an inaccessible pond in the Louisiana marsh. This pond was surrounded by the usual thick growth of marsh vegetation, while a profusion of eel grass and coontail grew in the water. I had thought it would prove to be a veritable paradise for ducks, but for some reason I was never able to attract the wildfowl into the pond with my wooden decoys and bamboo call, and was forced to content myself with knocking down an occasional straggler.

Looking across the marsh, I could see oak trees in the distance, growing along a ridge in the lowlands. Perhaps the ducks were more partial to the country beyond those trees. This thought came to me several times during the morning, and at length I had thoroughly convinced myself that the ducks were there, and there in great numbers. Spurred on by this unwarranted but sincere belief, I paddled across the pond and started the long walk and drag across the marsh. Drag, because I wanted to take my boat along, in case the country I found beyond the trees required a boat for successful hunting.

The marsh was soft and the tide was high, so I had little trouble in dragging my boat behind me as I selected grass clumps and root growths for footing. Occasionally, the surface crust would give way as some muskrat run collapsed, sending me knee deep or thigh deep into the soft marsh. I did not mind these slight mishaps but plowed right on until I came to the higher marsh near the ridge. Here, although my footing was more easily obtained, the going was harder due to the thick growth of **paille fine** (marsh grass) which made the dragging of the boat more difficult.

DUCK PARADISE

On the ridge, the **paille fine** gave place to a soft cushion of Bermuda grass, now browned by the winter's touch. Down the center of this **cheniere,** as a Louisiana Frenchman would call the ridge, ran a placid little bayou undulating between the massive live oak trees as the dark water flowed slowly to the Gulf. I pushed my pirogue into the water and after paddling across the bayou, again started to drag the boat. Soon I had cleared the narrow ridge of high land and was again in the low marsh. Immediately I realized that my hunch had been good, for this side of the ridge was very different from the other. True, both sides were lowlands but here the marsh was much softer, and instead of the thick growth of **paille fine,** I found **paille des oie** (goose grass), **jonc plat** (cat tail), and **jonc coupant** (cut grass).

The going soon became too soft for further walking, and I took to the boat and pushed along with my push-pole. The marsh now opened into a series of shallow, well vegetated ponds. What a paradise for ducks, and what hordes left with a deafening roar at my approach! Their departure worried me but little, as I could see that they were feeding and was confident that they would return. I selected a point with a view to keeping the sun out of my eyes, and the wind at the rear, but a little to one side, and made a blind from some **roseaux cane** which I had cut and brought along in the pirogue for just this purpose.

I was not lonely in that solitary marsh. That was hardly possible with a gun barrel between my fingers and swift flying ducks before my eyes. Now, four pintails were coming in, no need to call, no need to whistle. The ducks had seen my half dozen wooden make-believes and had not forgotten the luscious grasses of the pond—they were coming in and soon they would be mine. But my confidence was premature, for just as I was about to bring up my gun, they towered and towered. Off they went, never to return,

■ **A Mallard drake folds up in the air.**

four long-winged, slender bodied, spike tailed beauties; some saved from a bad scare and some saved from death by the glistening white of a shell box, which, unnoticed, had drifted into the open water in front of the blind.

It was only the work of a few moments to push the boat out into the open water and dispatch the shell box by the simple means of pushing the cardboard down into the soft bottom of the pond. Once again I was crouched in the narrow space between the two walls of flimsy cane that formed my blind. With a bit of bamboo to my lips, I called loudly. Ordinarily I do not favor loud calling, but the sight of seven mallards hell bent for parts unknown was enough to bring on a noise unequalled by any roadside drink-stand radio. The mallards must have heard the call. They wavered, they wheeled, straight for the blind they came.

THE SPEEDY MALLARD

The mallards were in range, they were circling the blind. Up came my gun, a deafening roar, the spat of pellets and a splash of water. One drake was down, and now another fell. My third load went wild and then the ducks were out of range. What climbers mallards are! When they beat those long and graceful wings, they rise with a speed which would indicate that their wings were pressing against firmer stuff than unstable air! I watched the mallards as they sped upward and onward until they had disappeared from view and had gained the safety which they sought, hoping the while that the next spot they chose for a landing would not be another of man's cruel deceptions.

A strong wind picked up. Little white clouds raced across the sky, and miniature whitecaps rolled in the ponds. An ominous black cloud obscured the sun, and I knew that before long a drenching rain would fall. I rooted out my raincoat, one of those nightgown affairs so fine for duckhunting, and laid it nearby, ready to slip overhead with the first few drops of rain.

My attention was diverted by the whistle of wings. Pintails overhead. I reached for my gun; the sky was now literally full of ducks—pitching, sailing, climbing ducks, flying this way and that, without apparent objective or destination. A drake pintail fell as I pressed the trigger, while the second, third and fourth shots went wild. What man alive could view such a sight and remain calm! Perhaps one of those phlegmatic individuals, who can hear the roar of a covey of quail rising from underfoot without a flinch, or who can witness the gorgeous silver leap of a tarpon without a whoop of joy, or who can come upon the swollen, poisoned body of a pointer without a feeling of revulsion, horror and hatred for the poisoner. Such a man might not have become excited, but I was excited and glad of it. What mattered a few misses. What mattered a few wasted shells. The sky was full of ducks and I was having the time of my life.

The barrel of my gun was warm, and the shooting was fast and furious. Now a little green wing came whizzing in, only to depart even more rapidly at the sound of burning powder and singing shot. Widgeon dropped from the sky on set wings and whistling primaries, mallards circled the blind while shovelers "plopped" among the decoys. I was at a loss which to pick, and 'ere my addled brain could decide, the ducks had gone.

■ **"Camera catches dead duck."**

But in their place came others, pintails this time, and some to stay, for now I had myself in hand and no longer was I excited as a child at a circus. Carefully figuring my lead, I drew on a slim necked beauty, pulled my gun ahead and fired.

TOO MUCH RAIN

Down he came, hitting the soft marsh with a plop. Swinging to another pintail, I scored again, and then came the rain. Rain in torrents. A cold, drenching rain, but the ducks didn't seem to mind, and the flight continued. I fired a few loads but the rain soon made me lay aside my gun and reach for my coat. Already I was pretty wet and by the time I had slipped the awkward coat over my head and pulled it down, I was wondering if there was any use in putting it on at all. The rain was now little short of a deluge, and I was kept pretty busy with the sponge reducing the water level in the pirogue. The wind had gone down with the coming of the rain and now the ducks had ceased to fly.

A half, three-quarters, one hour went by, and still no let-up in the rain. Unable to stand the monotony of doing nothing, I pushed out of the blind and started to pick up my kill. Three pintails, two mallards, a teal and a widgeon made up my bag. I returned to the blind. The rain slackened up and the sun began to peep out timidly from behind the clouds.

I put my ducks amidships in the boat, mindful of the long homeward drag before me. Counting, I totalled seven ducks; three more and the hunt would be over. The rain had stopped, the sky was clear, but no ducks were to be seen. The deluge had been too much for even the well-oiled feathers of the ducks.

■ **Typical Louisiana guides.**

SNEAK SHOOTING

Again I pushed out of the blind. I would try a little sneak shooting. Leaving my wooden decoys stacked in front of the now empty blind, I loaded my gun and laid it in the boat in front of me. Then, taking the paddle, I moved the boat along softly and slowly, keeping close to the edge of the marsh, and made my way through the ponds until I came to a long point jutting out into the water. As I crouched low in the pirogue and peered around the point, I caught a glimpse of five mallards, preening their feathers and generally disporting themselves. I dug the paddle in hard and sent the light boat shooting across the point. The mallards were already in the air. What climbers those birds were! Wet feathers seemed little hindrance to them. I dropped the paddle and reached for the gun. There was still time for a single load and that load brought results. I paddled over and picked up the duck—a splendid green head.

Two gadwalls got up as I stealthily entered another little bayou. My swing was right once more and, since I was closer than before, I was able to let go two loads instead of one. Much to my delight, both ducks fell and were soon added to those already in the boat. My limit was reached.

So started the long paddle and drag back home. No longer was I spurred on by anticipation, and no longer were my muscles fresh. The muskrat runs which on the outward trip had caused me so little worry were now a source of annoy-

■ **The author calling.**

■ Louisiana duck country.

■ "A whistle of wings."

ance and pain. It seemed that I was unable to put my foot down without sinking to my hips in one of these burrows, and what strength it took to pull free from that clinging ooze!

No longer did I shiver with the winter's chill, but perspiration soaked my clothes. I stumbled and fell time and again, only to rise once more and drag onward again.

But I was not disheartened by these troubles! No, a thousand times, no! I was happy, supremely happy. I had shot the limit on ducks. I had had the time of my life. I had played a hunch and won!

◆

NO LOUISIANA GRANITE

There are no available deposits of granite in Louisiana. All surface deposits in Louisiana are of a sedimentary nature. Granite is an igneous rock. So far as we know all granite in Louisiana is buried by thousands of feet of sediments.

◆

POOLING FOR DRILLING

The right of the State to force pooling is based on (1) the proper exercise of the police power of the State in the prevention of waste; too close drilling of many fields is directly conducive to waste. (2) The right of the State to force pooling is based on the doctrine of correlative rights. Close spacing of wells in many fields might lead to premature dissipation of the reservoir energy in which all property owners in the field have an equal interest, which can only be protected by proper and uniform spacing.

THE SCREECH OWL

The Florida screech owl, **Otus asio floridanus,** is a fairly common permanent resident throughout Louisiana. It is one of our small owls, being about eight or nine inches in length. Normal coloration is dark gray mixed with blackish and pale gray on the upper parts of the bird, and white or nearly so below with streaks and bars of blackish. It lives almost everywhere from the deep forests to the more open country, but usually where there are trees. Its nest is situated in woodlands or in various kinds of cultivated areas, particularly orchards and shade trees. It is abroad mostly during the night and spends the daylight hours quietly perched in some secluded spot.

The food of the owl is varied, but it lives largely on mice, rats, and other mammals, various kinds of large insects, and a variety of other foods, such as crawfishes, earthworms, scorpions, lizards, frogs, fishes and birds. The note of this owl is rather weird and tremulous, from which the name 'shivering owl' has arisen. It is also in the South called 'squinch owl' and the French of Louisiana call it 'chouette.'

◆

BIRD BANDING

A Louisiana heron banded at Avery Island in 1921 was taken in a muskrat trap near Morgan City on February 11, 1931, ten years later. When a bird is banded a record is made of the band number and specie and sex of the bird, and a duplicate of this record is sent to the United States Biological Survey at Washington.

ANIS

Anis are tropical birds belonging to the cuckoo family. Two species, the groove-billed and the smooth-billed ani occur as casual visitors in central and southern Louisiana. Suggesting rather awkward blackbirds in appearance and flight, the anis are fond of consorting with grazing cattle from which they obtain various ticks or insects disturbed by the movements of the herd. Anis exhibit astonishing behavior in that they construct a single large nest in which all the females of the flock lay their eggs, depositing them in layers with dry leaves between them.

◆

SOFT-SHELL CRABS

Despite considerable popular opinion otherwise, soft-shell crabs are not different species of crabs but are merely specimens of the blue crab, **Callinectes sp.,** that have very recently shed their shell.

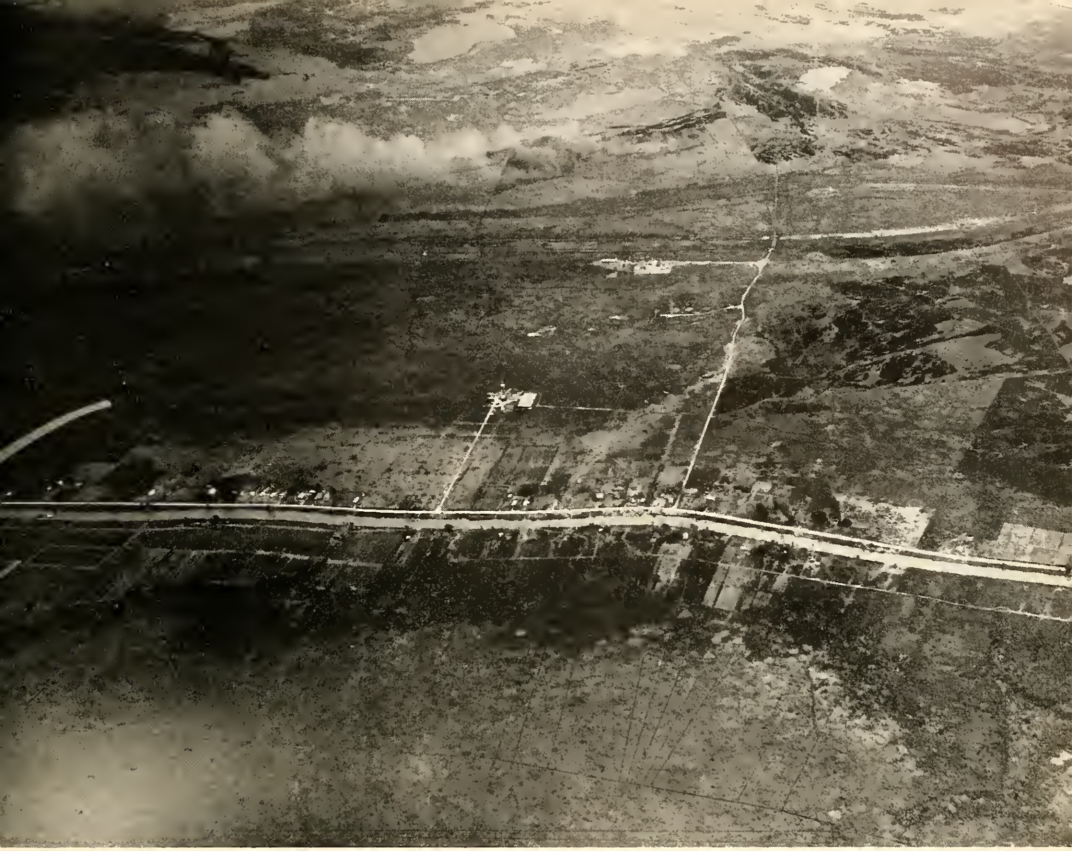
◆

LEMON FISH

Lemon fish and ling are the names commonly applied in Louisiana to the cobia (also spelled cabio), the single North American member of a typically tropical fish family. Its technical name is **Rachycentron canadus.** It is commonly known in Florida as the crabeater or sergeant fish and on the Atlantic coast as the black bonito. A fine fighter and a good food fish, individuals weighing as much as 84 pounds have been caught by rod and reel. It reaches a length of five feet. Average specimens, however, usually run about 10 pounds.

■ "My wooden decoys were set out in the thick vegetation of the pond."

■ "As I rounded the point I came upon five Mallards."



avis Aerial Photographic Service, Houma, La.

■ Humble Oil & Refining Company's operations at Lirette on Bayou Terrebonne. The well in the center is the F. Wurzlow No. 1 Immediately above it and slightly to the south is the discovery well, Ellender No. 1. Farther south is C. Wurzlow No. 1.

The Old Terrebonne Gas Field

By
John J. Metzger, Jr.

Very little has been recorded of the first gas field in South Louisiana. It is the Lirette Field, located in the southeastern part of Terrebonne Parish. Commercial gas was discovered by McCormick and others in 1917. The pipe line was finished in October, 1918, to domestic service in Houma and the Sugar Refineries. The total gas production was 5,384,570,000 cubic feet. The present development is in the hands of the Humble Oil & Refining Company, Fohs Oil Company, Union Producing Company and Shell Petroleum Corporation.

The Lirette, or as it was formerly called the old "Terrebonne Gas Field" is located in Township 19 South, Range 19 East, Terrebonne Parish. The gas structure extended under sections 32, 33, 50 and 51. The field, reached by a gravel road, is approximately 27 miles from Houma, the nearest town of any consequence and railroad point. Bayou Terrebonne does not quite bisect the old gas structure. Its general direction is Northeast-Southwest. Bayou Point Barre on the east also traverses the structure in a North-South direction. There were approximately 400 gas producing acres.

The topography of this area is a gently sloping marsh towards Lake Barre, except along the banks of Bayou Terrebonne and Point Barre. The elevation varies from sea level to approximately two feet. The marsh is divided by numerous streams and lakes.

Attention was first called to this area by numerous gas seeps and small so-called "gas knolls." These knolls range in height up to six feet above the marsh.

HISTORY

The first wells drilled in this area known as the Terrebonne Gas Field or Lirette was dug by Pickard and Heywood Brothers (Gulf Refining Company) sometime in 1904. The well was drilled to a depth of 1080 feet. The well was

TABLE NO. 2

LIRETTE GAS FIELD

WELL DATA

Well Name	No.	Date Started	Date Completed	Size of 1st CSG	Depth Set	Size of 2nd CSG	Depth Set	Size of 3rd CSG or 1st Linear	Depth Set	Size of 2nd Linear	Depth Set	Gas Zone	Total Depth	Remarks
Lirette	1	1904	1904	6"	835	5½"	1080	....	....	....	....	....	1080	Drilled by Pickard & Heywood (Gulf Refining Company).
Lirette	1-D	12/ /10	12/ /10	....	....	....	....	4"	1372	....	....	1526–1600	1726	Well blew wild for 103 days.
Lirette	2	11/19/08	1/19/09	8"	625	6"	1685	4½"	2055	....	....	1521–1530	2555	Dry hole.
Lirette-Knapp	8	7/10/09	9/15/09	12"	570	6"	1495	..	..	....	....	....	1645	Ruined by Gas Blowout.
Dupont-Lirette	1	?	?	....	....		..	....	....	....	....	1525–1650	1670	Drilled by McCormick et al. Junked.
Dupont-Lirette	2	6/ /13	1913	10"	168	8"	1400	6"	1564	4"	1680	1560–1865	1865	Junked. Gas Pressure 500-600# (?)
Lirette	2	6/ /13	1913	10"	549	8"	?	6"	1500	4"	1670	1510–1650	1670	Small gas well—Sanded up.
Lirette	3	1913	1913	....	....	....	....	....	....	....	....	....	1865	Dry hole.
Lirette	4	12/29/16	3/17/17	8"	1525	6"	2378	....	....	....	....	2378–2473	2552	First commercial gas well—100 Million feet (192# thru 6" open)
Lirette	4-D	1/19/21	6/16/21	....	....		....	....	....	....	....	....	2678	Dry hole. Salt water.
Lirette	5	3/19/17	6/11/17	10"	?	8"	1182	6"	2365	....	....	2365–2665	2665	Well blew out—Gas Well—100 million feet.
Lirette	6	5/11/18	12/..../19	10"	404	6"	2402	4½"	2567 (?)	....	....	....	2705	Dry hole.
Lirette	7	7/9/17	1/6/18	8"	1378	6"	2448	4½"	3220	....	....	Below 3220	3565	Well blew out. Gas well.
Lirette	8	4/22/20	7/1/20	8"	536	4½"	2315	....	....	....	....	....	2315	Dry hole. Salt water with gas.
Lirette	9	4/26/23	7/6/23	10"	530	6"	1854	4½"	2320	3"	2476	....	2476	Dry hole. Salt water with gas.
Lirette	10	7/3/24	2/..../26	10"	609	8¼"	2665	6"	4337	....	....	....	5643	Dry hole. Salt water with gas.
Atlas-Knapp	1	10/28/22	4/4/23	10"	558	6"	2306	4½"	2345	....	....	?	4500	Dry hole. Junked.
Atlas-Knapp	2	?	3/..../19	....	....	....	....	....	....	....	....	?	2420	Gas well. ?
Atlas-Knapp	3	?	8/7/19	10"	578	6"	2303	....	....	....	....	?	2342	Gas well. 80 million feet.
Atlas-Knapp	4	?	..../..../19	....	....	....	....	....	....	....	....	?	2347	Gas well. 40 million feet.
Chaisson	1	11/11/26	2/4/27	10"	332	6"	2302	4½"	2332	3½"	2465	....	2522	Dry hole.
Fee	1	8/24/22	10/20/22	8"	903	6"	2314	4½"	2328	....	....	?	2328	Gas well.
Fee	1-D	7/31/23	..../..../23	....	....	....	....	4½"	4122	....	....	2455–2466	4428	Gas well. 1000# Rock Pressure.
Fee	2	5/6/26	6/27/26	10"	572	6"	2306	4½"	2344	....	....	?	2344	Gas well.
Fee	2-D	2/6/27	5/23/27	....	....	....	....	....	....	....	....	....	2594	Dry hole. Salt water and gas.
Orleans O.&G.	1	?	?	....	....	....	....	....	....	....	....	?	2420	Gas well. 90 million feet.
Orleans O.&G.	2	?	?	10"	525	6"	2380	....	....	....	....	....	3500	Dry hole.
Verret	1	8/15/19	11/1/19	10"	536	6"	2303	....	....	....	....	....	2347	Gas well.
Verret	1-D	5/..../25	7/15/25	....	....	....	....	4¾"	2397	3½"	2451	2451–2466	2466	Gas well.
Verret	2	9/10/21	11/1/21	10"	499	6"	2305	....	....	....	....	2305–2335	2335	Gas well.
Verret	2-D	6/14/22	7/10/22	....	....	4½"	2336	3½"	2442	2½"	2468	2463–2468	2468	Gas well. 15-20 million feet.
Verret	3	2/15/26	3/20/26	10"	592	6"	2325	....	....	....	....	2325–2333	2333	Gas well.
Verret	3-D	8/3/27	8/22/27	....	....	..	....	4½"	2450	3½"	2459	2452–2459	2459	Gas well. 920# Pressure.

abandoned until August, 1908, when the hole was deepened to 1726 feet, at this point the well blew out, cratered and caught fire. The well blew for 99 days before "bridging".[1] The Gulf drilled a second well to 2555 feet. On July 10th, 1909, Mr. I. N. Knapp started drilling Knapp No. 8 on the Lirette tract. The well blew out at 1645 feet, ruining the well.[2]

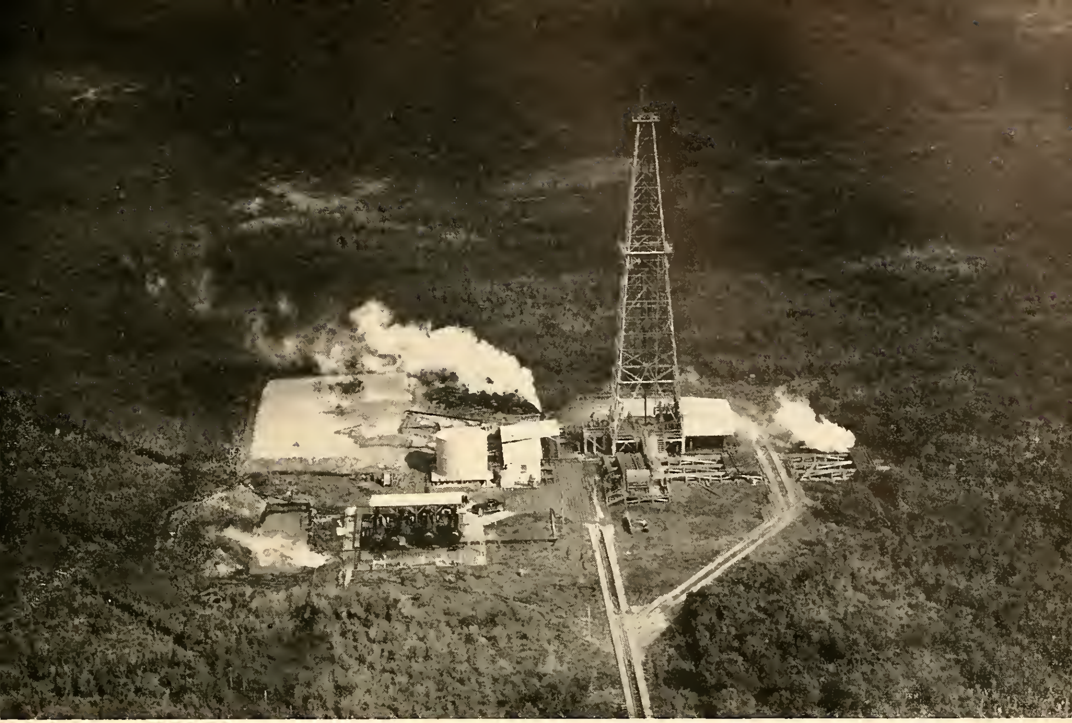
In 1910, Mr. Paul Dupont induced Messrs. W. B. McCormick, J. Y. Snyder and J. B. Hutchinson to drill their first well on the Lirette tract, which they leased on January, 1911. These men drilled four wells to a depth of 1500 feet, all of them producing gas with salt water. Drilling operations were then suspended for several years.

In 1916, Mr. McCormick and his associates induced Mr. J. H. Thatcher, owner of the Mansfield Gas Company, to look the territory over. He was so impressed that he joined with them and took charge of the operations, with J. P. Miller as driller.

DRILLING OPERATIONS

Drilling operations began on December 29th, 1916, and the first Commercial Gas well was completed on March 17th, 1917. This well had a capacity of over 100 million cubic feet of gas. The open flow pressure was 192 pounds per square inch through 6 inch casing. This well, Lirette No. 4, was at that time the largest gas producer in the world.

While the next well, Lirette No. 5, was being drilled a windstorm blew down the derrick on the discovery well, break-



■ United Gas Co. Funderburk No. 1, in old Lirette gas field, Terrebonne Parish.

ing off the control valve. The well blew wild for four days and was finally brought under control by stabbing another valve and die nipple into the 6 inch casing. No. 5 blew out while drilling and was controlled in a like manner.

Upon completing Lirette No. 5 as a gas producer of equal capacity to No. 4, it was decided to build a pipe line to Houma and the five sugar mills surrounding Houma. The Terrebonne Gas Company was organized in 1917. The pipe line consisting of 4" and 6" pipe was completed and gas turned into the City of Houma and the refineries in October, 1918.[3]

PRODUCTION DEVELOPMENT

The Terrebonne Gas Company, from 1917 to 1927, drilled 17 wells and deepened 6. The wells were of such magnitude that only one well was required to satisfy the consumption until late in 1923. At this time the wells began to make salt water, which gradually displaced the gas and flooded the producing area.

The Terrebonne Gas Company paid a flat price of $200 to the land owners for royalty for each well.

CONSUMPTION

The average yearly consumption for Houma was 75,000,000 cubic feet of gas. The Terrebonne Gas Company had approximately 1250 meters installed in the City. The industrial price for gas was 25 cents per thousand on a sliding scale, and for city distribution 45 cents per thousand.

■ Lirette No. 5 blowing before derrick collapsed.

TABLE NO. 1

Gas Production and Drilling Data[4]

Year	Gas Production Thousand Cu. Ft.	Wells Drilled	Wells Deepened
1917	.. ..	3	....
1918	189,604	2	....
1919	646,048	4	....
1920	890,943	1	....
1921	743,317	1	1
1922	625,902	0	1
1923	555,307	2	1
1924	595,667	0	
1925	646,765	0	1
1926	483,876	3	....
1927	7,141	1	2
TOTAL	5,384,570	17	6

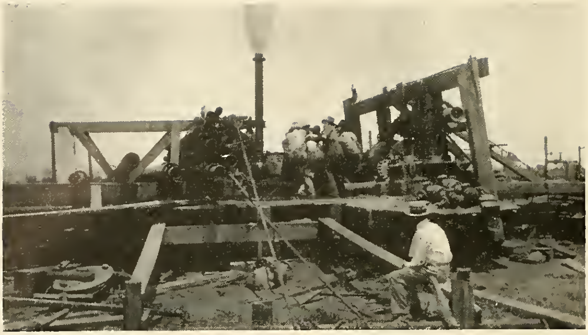
TABLE NO. 3

Consumption Figures for the Sugar Refineries for One Year

Name	Thousand Cu. Ft.
Southdown Refinery	259,489
Ashland Refinery	41,361
Terrebonne Sugar Refinery	17,002
Argyle Refinery	7,832
Myrtle Grove	5,386
Total	331,070

PRESENT DEVELOPMENT

In 1936, The Humble Oil and Refining Company obtained leases in this area and on May 11th, 1937, completed their



■ **Lirette No. 4 blowing wild after windstorm blew down the derrick, breaking off control valve. Men stabbing new valve and die npiple in casing.**

Ellender No. 1 in Section 32 from a depth of 11,620-630 feet. (Deepest production at that time.) Due to mechanical difficulties the well was plugged back to 10,520-525 and completed as a gas distillate producer on October 16th, 1937. The Humble drilled their next well F. Wurzlow No. 1 to a depth of 11,347 feet and abandoned it. Their Calvin Wurzlow No. 1 was completed on July 9th, 1938, as a gas well from a depth of 8421-35. The Humble is at present operating one rig in this field. The Union Producing Company drilled one well, Funderburk No. 1, in Section 50, dry at 11,924 feet. Fohs Oil Company, in Section 41, drilled their State Bay Baptiste No. 1 to a depth of 13,407 feet (second deepest well in the world). The well was completed on August 17th, 1938, producing gas from 11,172-78 feet.

■ **Well completely under control with new valves and clamps.**

ACKNOWLEDGMENT

The writer is indebted to friends who have read and criticized this paper. I tender special thanks to Mr. J. H. Thatcher who allowed me to use his photographs and the Terrebonne Gas Company's Records, and to Mr. Walter Larke of the Fohs Oil Company for the use of data pertaining to this area.

BIBLIOGRAPHY

[1] Oil Investors Journal for September 6th, 1908, pg. 18.

[2] United States Geological Survey. Bulletin No. 429, pg. 169.

[3] Records of The Terrebonne Gas Company, Houma, Louisiana.

[4] Department of Conservation 8th Biennial Report 1926-1928, pg. 148.

* * *

The U. S. S. Pelican, $100,000 floating laboratory of the U. S. Bureau of Fisheries, left Gulfport on November 8th on a 10-day shrimp investigation conducted annually by the Bureau in cooperation with the Louisiana Department of Conservation.

DEER FOR TCHEFUNCTE PARK

The Department of Conservation recently completed a four-acre enclosure for deer in the newly acquired Tchefuncte State Park in St. Tammany Parish.

The Division of Forestry has a deer farm located on the state forest at Woodworth, Louisiana, and during the month fo October five does and five fawn were shipped to the new deer reservation.

The Department of Conservation is vitally interested in the restocking of wild life in the State of Louisiana, and one of its plans is to liberate the surplus increase of deer from time to time to restock the natural wild life areas of the State.

* * *

DOLPHIN

Dolphin are true fish that typically haunt the open ocean. The common dolphin reaches a length of about six feet, is bright golden green in color, with small, round, sky-blue spots. Dolphin are among the swiftest fish known.

During the present fishing season large numbers of dolphin appeared along the coastal waters of Louisiana.

The term dolphin has also been applied in some parts of the world to members of the porpoise family, which are not fish at all but marine mammals. Dolphin are palatable food.

* * *

CATFISH AND BUFFALOFISH

Catfish and buffalofish reach different sizes for different species. The eel cat or willow cat attains 15 pounds, the channel cat 15 to 20 pounds, the yellow cat or goujon 100 pounds, while the blue cat, although it averages between 15 and 20 pounds, has been recorded with the gigantic weight of 250 pounds.

The common buffalo reaches a length of about two and one-half feet, with a weight of 50 pounds. The round or black buffalo, though usually less than 20 pounds, has been known to exceed 50 pounds.

■ **Well closed in after die nipple had been screwed into the casing.**

Quail Hatcheries

Their Purpose and Function in Conservation

By
Roland Abegg

■ **Roland Abegg, superintendent of the L. S. U. quail hatchery, with Mrs. Abegg, who is holding nesting box containing eggs.**

When the Louisiana State University College of Agriculture, under the deanship of Major J. G. Lee, purchased a tract of land on the Perkin's Road about four miles east of the University campus, they generously consented to give the use of about thirty acres of land for the Louisiana State University Quail Hatchery. The plans for the organization of the Quail Hatchery were begun in the winter of 1936 by Mr. Wm. G. Rankin, Commissioner of Conservation for the State of Louisiana, Mr. Armand P. Daspit, Director of Fur and Wildlife of the Department of Conservation, and Dr. Wm. H. Gates, Head of the Zoology Department at L. S. U. In June, 1937, the Department of Conservation, as sponsor, began the construction of some of the buildings now standing. During the following winter many improvements were accomplished, quail were brought from the Lacomb Hatchery and equipment was installed, so that by the middle of April, 1938, the hatchery was ready for operation.

NEED OF HATCHERIES

Quail hunting is probably the greatest sport in the Southern, Eastern, and Midwestern parts of the United States. Not many years ago the possibility of any depletion in the quail in the Southeast was unthought of by most people. As the years went by the agricultural methods became more and more perfected toward the production of larger crops to the exclusion of all else. This was to be expected, for the aim was increased production and utilization of all available land. There was no opposition to this trend, for indeed, who would have thought to oppose a program which increases the farmer's yield so tremendously? Yet this type of farming leaves few uncut ditch banks, fence rows or other undisturbed places where quail can establish their nests and rear a brood of young birds in comparative safety. These ditch banks and fence rows also constitute the main avenues and highways of travel for wild life. With the removal of these nesting sites, the breeding birds are forced to low, poorly drained lands where the nests are often drowned out during the heavy summer rains.

In looking over old hunting records kept by the sportsmen when the land was being opened up it was found that the pioneer enjoyed an abundance of game never dreamed of by the redman. This increase is explained by the greater field space and the better distribution of cover and food found in the marginal areas between field and forest. By cover we mean briar tangles, brush, weeds or any other shelter for game. Stoddard sums up this conception of the balance between food and cover for the bobwhite in his book **The Bobwhite Quail; its Habits, Preservation and Increase:**

"Food and cover are of equal importance to the covey range, and one is of little use without the other. Farms so intensively cultivated and pastured that there is no cover can have no quail; while cover, be it ever so attractive, without suitable food, will be equally barren of birds."

THE PASSENGER PIGEON

It will probably be many years before an intergrated program can be worked out which will meet the demands of the conservationist and the farmer. This is to be expected, for our natural resources, of which game is an important member, are always disregarded by the public until some catastrophe occurs such as the extinction of a once common bird or animal. The passenger pigeon was probably the most plentiful bird in the United States during the last century. Oldtimers tell of the sun being blotted out as countless thousands swept in front of it. The passenger pigeon, like its close relative

■ **General view of L. S. U. quail hatchery, operated by the Department of Conservation.**

the mourning dove, was considered an excellent table dish. Commercial hunters would net and kill them by the thousands and after dressing, pack them in ice by the barrels full and ship them to the markets in the big cities. The slaughter went on for years and in 1892 their extinction was predicted. At that time they no longer nested in colonies such as they did in Michigan, in 1877, where one colony covered an area twenty-eight miles long and three to four miles wide, but they nested in isolated pairs scattered over the country. The last passenger pigeon was shot in Connecticut, in 1906. Yet less than a century before, in 1808, Wilson observed a flock of passenger pigeons near Frankfort, Kentucky, and estimated their numbers at not less than 2,230,270,000.

HUNTING RESTRICTIONS

Hunting by man was the cause of this once numberless bird's extinction. Since then laws have been passed, more closely regulating the hunting activities by man. These laws have limited the number of game birds to be killed and also limited the time of year when they may be hunted. This latter point is of greatest significance. The open season on any species is regulated by the breeding season of that species, thus allowing the young to be raised to an age when they are able to care for themselves. It is the young of one season which becomes the breeders of the following year and will insure the constant supply of game. Despite this fact there are many people who never think of this and hunt during the breeding season regardless of the law. However, few of these people would deliberately kill all the quail in the United States, could it be done, nor would they condone such a scheme. They would easily recognize their responsibility to future generations. Yet they persist in hunting out of season and shooting more than the bag limit. I have heard several of these "sportsmen" even brag about their lawlessness with the clearest of conscience. Unconsciously they are allying themselves with a group, however unorganized it may be, which is bent on the destruction of our wild life. These people have a lust for blood, which might beneficially be expended upon the destruction of stray cats and dogs which roam the countryside, taking a heavier toll of game birds than even the sportsmen themselves. And as the "butchers" mentioned above, they do not limit themselves to game birds alone, but count anything that creeps, crawls, walks, or flies as fair game. The prevalence of these three pests, stray cats, dogs, and "butchers", is partly responsible for the failure to successfully introduce the pheasant into the South and to maintain our wildlife at its former abundance.

Until the people are willing to cooperate with the conservation movement, to the extent of observing the laws that the state and national governments have seen fit to establish in the best interest of the public, some agency will have to take the responsibility of insuring the preservation of our game. This function has been assumed for Louisiana by the Department of Conservation through the hatcheries it has established to date at Lacomb, Baton Rouge, Natchitoches and Ruston.

TO ASSIST NATURE

However, these hatcheries are not to function for nature but rather to aid and abet her efforts. Neither are these hatcheries to supply unlimited quantities of game to be butchered by the thoughtless sportsmen, if we may call them such. Rather the hatcheries are here to help remedy the evils already wrought upon the land, and give back to the people that which they have lost through lack of foresight. While the game in any civilized country has belonged to the state from time immemorial, the people are the real custodians of the wildlife and not the government agents and law making bodies. It has been truly said that laws can be passed, but unless it is the will of the people it is no law. For a law to be effective, it must be the expression of the will of the society which makes it.

PURPOSE OF HATCHERIES

There are two objectives toward which these hatcheries are striving. The more immediate one is the raising of birds to be released on areas which have been chosen for their need to be restocked. The second purpose is that of studying ways of improving the present methods of raising birds in captivity. This second purpose may be called experimentation and will eventually include a third purpose, that of studying the habits of the quail in the State of Louisiana, so that conditions may be made more favorable for the birds to raise their own young in the wild.

MANAGEMENT OF BREEDERS

The raising of birds still offers a fertile field of study and in the next few years there will be many changes in the methods used in this state. Of the many methods in use today the more common ones are: first, small bantam hens to hatch the eggs and brood the young, and second, artificial incubation and brooding in either large or small units. The latter, with electrical equipment for large scale production, is in use at the L. S. U. Quail Hatchery.

During the Winter the breeding stock is placed in wire bottom holding pens large enough to accommodate ten birds. The wire floors are used to prevent the spread of disease through the contamination of the ground. Males and females are put in separate pens, as the males will fight among themselves more readily if a female is present. In order to keep the birds healthy and in proper condition for high egg production in the spring, it is important to feed them a well balanced diet at all times. Proper feeding insures healthy eggs from healthy birds. As quail need a high protein diet similar to the turkey, it is common practice to feed some recommended turkey mash for laying birds. Besides this mash some reputable scratch grain should be kept before the birds at all times, about one pound for every three pounds of mash consumed. Oyster shell of medium size, grit, and a constant supply of clean drinking water are essential to the birds.

PAIRING AND EGG PRODUCTION

At the beginning of March the breeders are paired off in the breeding coops, usually one pair to a coop. The sexes may be readily distinguished by the color markings on the head. The male has black and white markings, whereas the female has black and yellowish-brown markings. The feeding rations are slightly altered at this time, the amount of scratch grain being reduced to one pound of grain to every five pounds of lay mash. Fresh lettuce is fed to the birds several times per week throughout the year.

When the quail begin laying in the early part of April, the eggs are gathered once a week until the beginning of September when they stop laying. In nature the birds lay but one clutch of eggs a season, composed of ten to twenty eggs. However, should the nest be destroyed before the eggs are hatched, the birds will renest and continue to renest until the end of August or until they have successfully hatched off a clutch. The birds that renest until late in the season have given rise to the popular fallacy that quail raise two broods a year. In captivity, where a clutch is not allowed to be completed, the average number of eggs produced each year by a single female is sixty. The greatest number recorded for any one year is 128 eggs. The eggs are laid either in a nesting box supplied in each coop or, as is most usual, on the floor of the cage.

When the eggs are collected the coop number and date is marked on each egg, so the number of eggs from each female can be recorded on a permanent record sheet. This record shows the number of eggs laid, the number broken, the number of irregular eggs, the number placed in the incubator, also the number of infertile eggs, the number of eggs that failed to hatch, and the number hatched. Besides this weekly record a summary of the facts for the two previous years is listed at the top of the page. At a glance then, it is possible to judge the value of the hen as a breeder for the following year. Breeders should always be chosen by the record of previous years or by the records of their parents. This is known as selective mating and is important for the maintainance of a high egg production.

INCUBATION

As quail will not incubate their own eggs in captivity, several methods have been developed to do this for them. For the small scale operator the bantam hen method is satisfactory, despite the greater menace of disease and loss through the hen stepping on the small chicks. Quail are very susceptible to most poultry diseases and it is best to isolate the quail from any contact with poultry. The electric incubator has proven most successful for large scale production and superior to the oil burner type, as a more even temperature can be maintained. Previous to putting in the first setting of eggs, the incubator is thoroughly disinfected and operated several days to insure its proper operation at a constant temperature and humidity. This varies with different makes of incubators, but it is usually within a degree of 100°F. Until the nineteenth day the humidity is kept between 80-85°F. as registered on a wet bulb thermometer. This is sufficient humidity to prevent the eggs from drying out. The eggs are turned three times per day for the same period of time. The proper humidity and the turning of the eggs, prevent the yolk and developing birds from sticking to the shell.

On the twentieth day the eggs are placed in the hatching tray and no longer turned, and the humidity is raised so that the wet bulb thermometer registers between 90-95°F. If the humidity were less the chick would stick to the shell, and if any greater the air cell into which the chick crawls previous to hatching would be too small. In either case the result would be the failure of the chick to hatch.

Just before hatching on the twenty-third day, the young bird makes a small hole in the shell with a sharp horny point located on the top of the upper bill. This point is lost a few hours after hatching. When the hole is made the bird is said to have pipped the egg. Then with this horny point the bird, starting with the hole, cuts out the top of the egg, just above the largest diameter. When the cutting is completed, there is a perfectly circular lid hinged on a small piece of uncut inner egg membrane. By kicking spasmodically, almost convulsively, the chick extracts itself from the egg, leaving the lid still hinged to the rest of the shell. The effort is so great that the chick is exhausted, and will lie prostrate for half an hour before being able to stand. In about three hours the chick is dry enough to be removed from the incubator. If through weakness the chick should fail to hatch on time, it is usually a cripple and should be destroyed.

BROODING

As with incubation there are several methods of brooding. Briefly listed they are: with bantam hens, male quail as foster parents, small unit brooders accommodating up to twenty-five birds, battary brooders and large colony brooders, such as used at the L. S. U. Hatchery, which accommodate sixty birds.

When dry, the chicks are placed in a brooder that has been operated for several days to insure a constant temperature of 95°F. on the floor. In the installation of any brooder it is important to avoid all drafts, as the chicks chill very easily. The temperature is lowered 5°F. per week, until the fourth or fifth week depending on the weather. The chicks feed first after they are twenty-four hours old, however, until the fourth day they still receive some nourishment from the yolk sac which was drawn into

■ Pair of quail at L. S. U. hatchery.

the body before hatching. For the first two weeks the feed consists of finely chopped hard boiled egg and lettuce which are mixed with sand and a starting mash. (Mash refers to a pulverized mixture of organic material supplying the necessary proportion of fats and proteins. Chow refers to a mixture of ground or whole grains that supply the birds with the necessary roughage.) After the first week fine size chick chow is added to the mash. Dry mash and clean water are kept before the birds at all times from the start. When they are six weeks old, the starting mash is gradually changed to growing mash and the fine sized chow is replaced by coarse sized chick chow.

MISCELLANEOUS TECHNIQUES

Cleanliness is one of the most important factors in successfully managing pen-raised birds. This applies particularly to the young birds, whose diet seems harder to reproduce artificially than that of the adult birds, and are therefore more delicate and susceptible to disease. It has proven impractical or impossible to raise birds in captivity by actually duplicating their wild diet, and raising quail is such a new field that a completely satisfactory feeding schedule has yet to be developed.

About the eighth day it is often necessary to take some measure to prevent picking which is sometimes called cannabalism. The birds in some coops will start picking each other at the base of the bill, vent, and toes, and as soon as one shows a bloody spot the rest of the birds seem to concentrate on the wounded one, finally killing it. There is no sure cure for this, and the birds have to be constantly watched so that when it starts the condition can be relieved as much as possible. One method used is that of clipping the bill back to where the pink begins, which is effective until the bill has grown out again. The operation may then have to be repeated if the picking recommences. Another method is that of illuminating the brooders with red lights so that the blood will not be visible to the chicks. This is quite successful, for red shows up as black in red light, and apparently it is color that attracts the other birds. Sick birds are isolated or destroyed, and extra precautions may have to be taken in any coop where a contagious disease is found, or in a few days all the birds may die in epidemic swiftness. All utensiles are disenfected at regular intervals.

EXPERIMENTATION

As stated heretofore in this paper, there is still much left to be learned in the methods of rearing quail under artificial conditions. No system has been devised that will insure the raising of birds in every part of the country. Climatic conditions vary so that for each region having a different temperature, humidity, elevation, soil, vegetation, water, and rainfall, some variation of a recommended method for raising quail must be worked out, to suit these varying conditions.

The second field for experimentation is in the management of land and the releasing of birds. In other words, how can the land be made better for the wildlife already on the land, and for that to be released upon it? In another part of this paper the relation of food to cover was discussed, and it is only necessary to state here that it is a subject receiving much attention by the game manager.

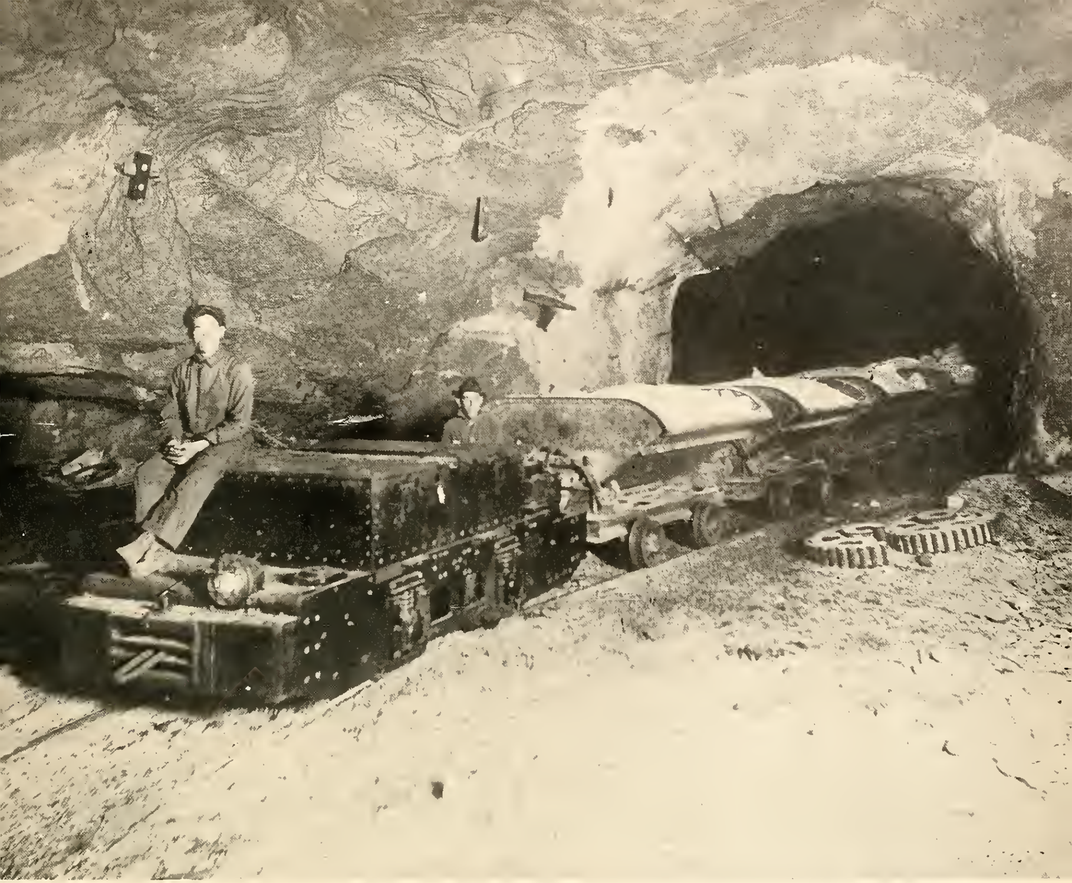
Even though food and cover were plentiful and properly proportioned there are still other factors which would keep down the quail population. Predators that prey directly upon the quail, their young or their eggs, the birds or animals that are competing for the same essentials of life as the quail, are but two of many such factors. The first is self explanatory, but the latter may be clarified by an example. In many places cattle ranges are fenced in, not so much to keep in the owner's cows, but rather to keep out his neighbor's cows and other animals competing for the same food. Strange as it may seem cattle compete with quail for the cover and food necessary to the quail. Lands that are overgrazed, leaving only a thin mat of grass and the trees, will be devoid for quail, for the cattle have successfully competed with the quail for its food and cover and driven it out. The dairymen and stockmen can by the better planning of pastures prevent this condition from becoming a menace to wildlife. In the national forests, where grazing lands are leased, overgrazing is jealously guarded against by the foresters.

THE BENEFICIAL HAWK

The saying, that it is an ill wind that blows no good, might well apply to our predators, for it must surely be a bad one that does no good. It is, therefore, necessary to study the effects of a suspected harmful predator upon our more desirable wildlife, then balance the harm it does against its benefits. In many cases the results were unexpected. All hawks, for instance, were once thought to be harmful, and there are still disillusioned places that offer bounties on any "chicken

[Turn to Page 25]

■ **View of breeding pens at L. S. U. quail hatchery.**



■ **Electric locomotive and salt train bringing salt to lift to be taken above ground. Mine of the Myles Salt Co. Ltd., Weeks, La.**

SALT

Louisiana's Buried Treasure

By
S. E. Evans

We the inhabitants of Louisiana, particularly those of us who live in the Gulf coastal region, should be justly proud of our good fortune in having been so richly endowed by Nature with Buried Treasure.

Our Buried Treasure does not consist of the legendary treasure of the days of early Louisiana and the riotous exploits of the Lafitte Brothers and Dominick You, but lies in our unlimited supply of valuable natural resources.

We take these treasures almost as much for granted as the air we breathe. Yet Louisiana with its vast deposits of Buried Treasures such as salt, oil and sulphur, is outstanding among the states of the United States.

Let us penetrate one of the treasure beds of natural resources and learn about Louisiana salt. We learn that salt in Louisiana is found in the form of domes, which re essentially a deep-seated, subcircular core of pure crystalized salt or as the chemical term implies—sodium chloride. These domes vary in diameter from a fractional part of a mile to more than two miles and their thickness or depth may be measured in thousands, if not tens of thousands, of feet. This formation of natural salt is extremely pure, averaging over 99% pure sodium chloride. Mother Nature, many thousands or perhaps millions of years ago, stored up this vast treasure house of pure salt so necessary to human life, to be later discovered and used by man. In its naturally pure state it is suited for both human and animal consumption without further refining.

To give some idea of the vast stock of salt in Louisiana's salt domes; it has been estimated that, assuming all the salt can be recovered from the many salt-domes of the coastal section, at the pres-

■ Compressed air drill working in pure rock salt in mine of Myles Salt Co., Weeks Island, La.

ent rate of use it would take over 300,000 years to exhaust the known salt reserve of the Louisiana and Texas salt domes alone.

Weeks Island, owned and operated by the Myles Salt Company, Limited, is one of the largest and purest known salt deposits and is frequently referred to as one of the Wonders of the World. At Weeks Island we find a solid dome of pure salt more than a mile and a half in diameter and extending to an unknown depth. Borings in Louisiana domes have been made to a depth of several thousand feet and salt is still known to exist.

ONE OF NATURE'S MARVELS

These salt domes are a thing of great wonder, Geologists claim that perhaps a million years ago a salt lake or ocean bottom existed here and was later evaporated and condensed under great pressure through the ages.

Weeks Island is located on the shores of Vermilion Bay on the lower Gulf Coastal section not more than one hundred and fifty miles from New Orleans. Salt in this dome is mined at an underground level of 600 feet, which floor level is reached by means of an elevator down through a shaft built through the dome of solid salt.

An unusual engineering accomplishment in this mining operation does away with timber bracings such as are found in most underground workings. At Weeks Island an equal weight of salt is left in the supporting columns as the salt is taken out. A plan view of these workings closely resembles a bee-hive, the holes being the huge chambers or rooms that are hollowed out and the salt removed. These huge rooms measure approximately 65 feet wide by 65 feet high.

This operation has been carried out over a period of over 36 years by extending from one room to another along the same floor level to where the present workings cover an area of about 55 acres. Although salt to the amount of more than 4,500,000 tons has been removed there has been no noticeable depletion of stock in this vast reserve.

One unique advantage found in this underground operation is the fact that the temperature is constant at about 75 degrees F. throughout all seasons and the walls of the mines, which are of solid salt, are so dry as to allow one to strike a match on them.

MODERN PLANT AT WEEKS ISLAND

At Weeks Island today is found one of the most modern salt plants, where up-to-date methods and electrified equipment has supplanted hand-shovels and mule-drawn cars of former days. Electric under-cutting machines, storage battery locomotives, drags, hoists and conveying machinery rush many hundreds of tons of pure salt above ground each day. Above ground in the mill we find the most modern of conveying machinery carrying the salt to crushers, mills, screeners and grading machines and on through the various stages of handling to packaging and bagging machinery where salt is packed in the many size containers for the innumerable grades and granulations of salt. Throughout this complete operation of handling salt it is "untouched by human hands".

The Myles Salt Company has publicized Louisiana Salt through this country and in many parts of the world. The slogan "A Grade for Every Need" has long been known and there is a need for every grade of this pure Louisiana salt in the various domestic and industrial processes where salt is required. Efficient loading and shipping facilities at this plant connect with both rail and water carriers (also the Intracoastal Canal) assuring quick deliveries to all parts of the country and for export shipment.

Aside from the salt plant itself with its huge under-ground treasure house of natural salt and the above ground plant which employs hundreds of people the Myles Salt Company maintains a beautiful, self-contained community in a natural and healthy setting along the shores of Vermilion Bay. This community housing more than a thousand people, maintains churches and schools for both white and colored.

Weeks Island is not a mining town but ranks with the most up-to-date communities, with every modern facility for the promotion of health and happiness. Modern sewage, electrified homes, library, medical supervision for health and sanitation, and many community interests such as a baseball team, scout troop, picture show, and all forms of outdoor recreation such as tennis, bathing, fishing and hunting, afford year 'round interests to every member of the community.

Thus it is we find the Buried Treasure of Louisiana has become commercialized and made to pay dividends; giving employment to many and supporting a whole community. The romance of treasure hunting when we hoped to find doubloons, louis d'or or pieces of eight has not been lost in the search for the true Buried Treasure of Louisiana in the form of its natural resources. The wealth of the treasure in most cases far exceeds the gold, silver and precious gems that have faded with the ghosts of Captain Kidd, Jean Lafitte and the roving pirates of our school-boy days. Louisiana's Buried Treasure will be the means by which the South and particularly the state of Louisiana will be numbered among the leading industrial sections of these United States.

Quail Hatcheries

[Continued from Page 22]

hawk", which of course means any hawk. This practice will soon be done away with entirely, for detailed studies of the food habits of the different species of hawks have shown that while all hawks will on rare occasions kill game birds, their main food consists of rodents. Thus, they become beneficial rather than injurious. The marsh hawk, for example, may kill a half-dozen quail in a year, but in turn it will probably kill six or seven hundred cotton rats in the same length of time. Cotton rats being extremely destructive of quail eggs, eating them whenever available, need to be controlled more than the marsh hawk. To complicate the matter in the North where the rodents are less plentiful, the marsh hawk may prey heavily on the pheasant, and in that case control of the marsh hawk would be advisable. Each predator should be judged, not by the preconceived fallacies of man, but on its own merits, and by them should rise or fall.

SUMMARY

The establishment of a series of quail hatcheries has been found necessary because of the rapid decline in the quail of this state. Much of this decline has been caused by the failure of sportsmen to observe the laws governing the season when quail and other game may be hunted, and in the frequency with which sportsmen exceed the bag limit. Likewise, the increasing prevalence of clean farming has conspired against the maintainance of a satisfactory quail population through the elimination of nesting sites and highways of travel.

The primary object of the hatchery is to raise quail, but it should also serve as a center for conducting studies in the life and habits of the bobwhite. Such studies would lead to the better management of land for their use. "Game can be restored by the creative use of the same tools which have heretofore destroyed it—axe, cow, plow, fire, and gun."[1]

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[1] Leopold, Aldo. *Game Management*. Chas. Scribner's Sons, New York. 1936.

ODORIZATION OF NATURAL GAS

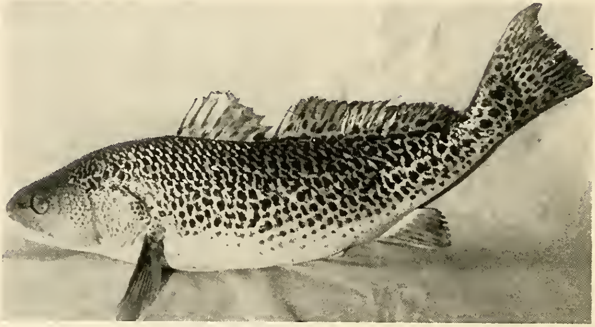
Act No. 409, passed at the last session of the Louisiana legislature, is an act "to require persons, firms, associations or corporations engaged in the business of handling, selling or distributing natural gas and other odorless gases, excepting liquified petroleum gases, for domestic use, or supplying the same by pipeline or otherwise to any public building or buildings where people reside or congregate, to malodorize such gases so as to indicate by a distinctive odor the presence of such gases."

Two Hybrid Redfish—Speckled Trout

Two hybrid fishes of exceptional interest, secured from different localities some two years apart, are shown in the accompanying photographs. They are interpreted by the writer as being crosses between the Redfish, **Sciaenops ocellata** (Linnaeus), and the Speckled Trout, **Eriscion nebulosus** (Cuvier and Valenciennes). An examination of the available literature fails to reveal any earlier record of such a hybrid. It is certain that the cross must be a rare one since even the least observant sportsman could not fail to note the unusual and impressive beauty of such individuals.

The first specimen was brought to the writer's attention by Mr. E. B. Cope of the Louisiana Department of Conservation, who noted it in the French Market in New Orleans during December, 1936. It was secured from Louisiana coastal waters below Buras. Strikingly beautiful in appearance this fish measured 36 inches total length and had a greatest depth of 7¾ inches. A cast of the specimen was prepared by the staff of the Conservation Museum. The fish's remarkable appearance presents a combination of Redfish body-shape with Speckled Trout pattern. The spaces between the black markings had assumed in the specimen a golden appearance of remarkable beauty.

The second specimen was obtained in July, 1937, by Mr. James N. McConnell, Director of the Oyster Division of the Conservation Commission and brought to the writer's attention. The specimen was permanently preserved. Measuring 23¼ inches in length this individual, as will appear from the photograph, presented an astonishingly similar appearance to the earlier specimen obtained. The black markings show a Speckled Trout pattern while the body form is definitely that of the Redfish. The first specimen possessed nine spines in the anterior dorsal, the second specimen nine spines in the anterior dorsal, and one spine and twenty-six soft rays in the second dorsal. The greatest depth of the second specimen was 5 inches.



■ **The second specimen was a singularly handsome fish.**

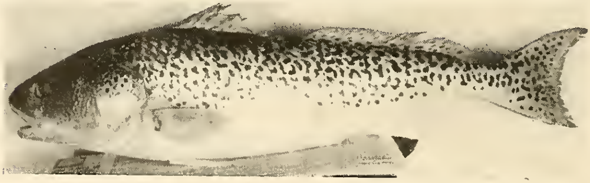
PUZZLING RESULTS FROM CROSS-BREEDING

The cross-breeding of distinct species in nature produces a wide range of interesting and often puzzling results. Many fishes, the Sunfishes (Centrarchidae), for example, frequently hybridize in nature, not only members of different species but even members of different genera crossing in this way. The Green Sunfish, **Apomotis cyanellus,** and Pumpkinseed, **Enpomotis gibbosus,** and the Pumpkinseed and the Bluegill, **Helioperca incisor,** cross breed in nature. Hubbs and Hubbs produced hybrids experimentally and compared these individuals both with natural hybrids captured from streams and the normal Pumpkinseed and Green Sunfish. They found the phenomenon of "hybrid vigor" strikingly present, the hybrids growing at about twice the rate of the pure bred Pumpkinseed and much faster than the pure bred Sunfishes. Growth in length of the hybrid stock was 36 percent greater than that of the Green Sunfish and 50 percent greater than that of the Pumpkinseed while growth in weight increased at 115 percent over the green Sunfishes and 180 percent over the Pumpkinseed.

Many native birds displayed interesting hybridization. Two birds, Brewster Warbler, **Vermivora leucobranchialis** (Brewster), and Lawrence Warbler, **Vermivora lawrencei** (Herrick), were originally described as new species. Both are now considered to be hybrids between the Blue-winged Warbler, **Vermivora pinus,** and the Golden-winged Warbler, **Vermivora chrysoptera.**

Duck hunters also frequently encounter hybrids which may present peculiar and often beautiful blending of the plumage patterns of the two species crossed. A fine example of a Mallard-Pintail hybrid is to be seen in the collections of the Department of Conservation Museum. The Bureau of Research of the Department of Conservation is much interested in securing reports and especially specimens of any such bybrids that may come to the attention of sportsmen since such data is not only of wide popular interest but is also of considerable scientific value.

—JAMES NELSON GOWANLOCH



■ **The first hybrid discovered.**

* * *

The sac-a-lait belongs to the sunfish family (the Centrarchidae), which in turn belongs to that large group of fishes, the Percoid fishes, or perches (order Percomorphi, or sub-order Percesoces).

Other important fresh water game fishes which belong to the sunfish family are the large-mouthed and small-mouthed black bass, the long-eared sunfish, the Warmouth bass, and the Rock bass.

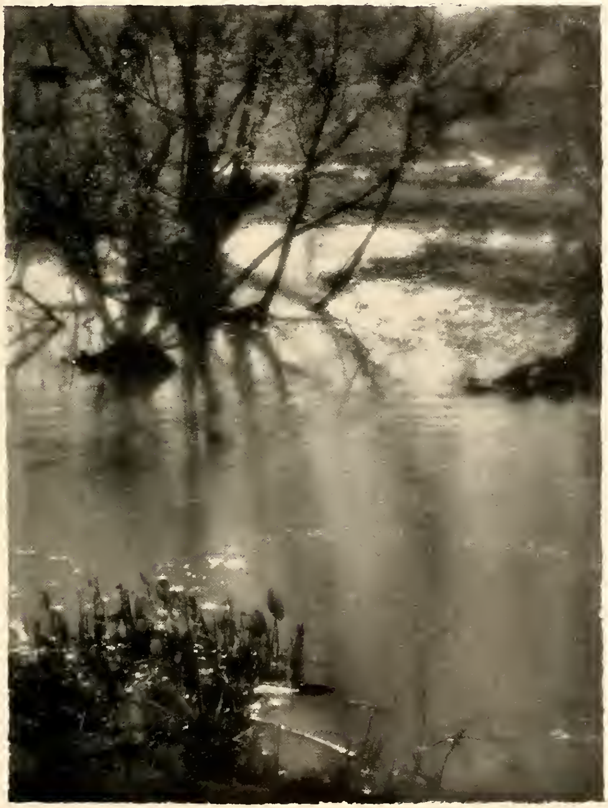
* * *

PRESSURE MAINTENANCE

"Pressure maintenance" is defined as the practice of returning gas from flush production to the oil formation for the purpose of keeping oil reservoir pressure and energy as near initial conditions as possible for the purpose of increasing the ultimate oil recovery of the field. Such an installation is in present use at the Tepetate field in Basile.

Lovely Louisiana

PHOTOGRAPHIC STUDIES BY DELACROIX



TRANQUILITY . . . . .

. . . . . the mellow sun-light drifts down through leafing willows, touching the dark green of shadowy pools with its wand of light . . . dissolving the shadows in irridescent colors . . . a vista of eerie enchantment . . . . .

Lovely Louisiana

PEACE . . . . .

. . . . . "far from the madding crowd" . . . a winding road through the dim forest . . . in the twilight gloaming solitude and peace, undisturbed by the harsh sounds of a nervous world . . . . .

Lovely Louisiana

..... the photographer's art has given us this pastoral scene suggestive of a master's landscape painting ... trees leaning towards the cattle, here to quench their thirst through the noon-day heat ... faint rustle of leaves and murmur of a placid little stream .....

NOON-DAY REST .....

Lovely Louisiana

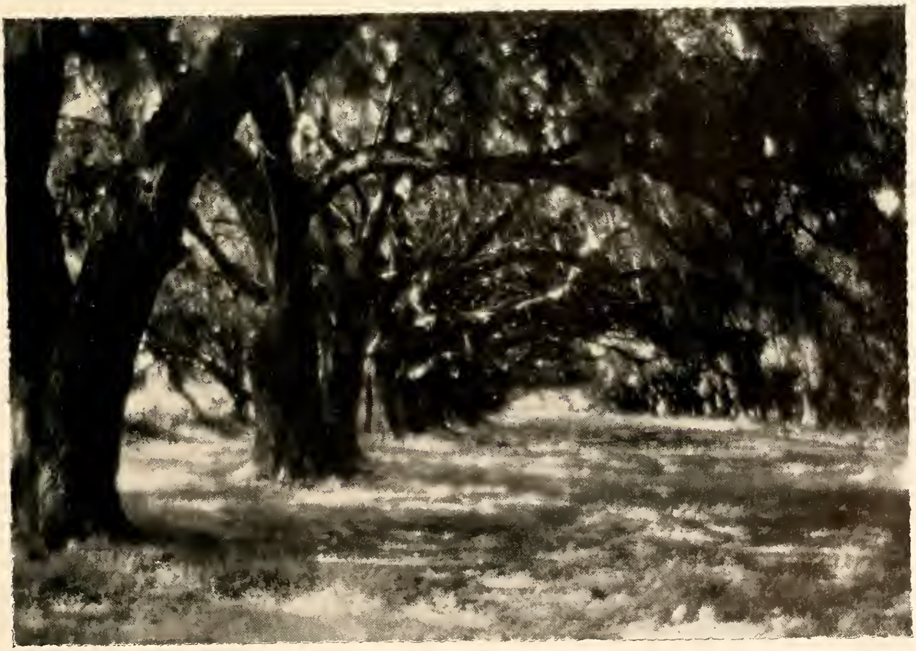
LOUISIANA BAYOU . . . . .

. . . . . meandering through the lowlands, intimate of live oaks and low-hanging draperies of moss, this sleepy bayou invites the passerby to pause on its banks and meditate upon those imponderables of life that are measured neither by Time or Space . . . . .

Lovely Louisiana

. . . . . these giant oaks stand sentinel here, their spreading arms at rest . . . Nature's own memorial to one of the world's historic battles . . . this ground was hallowed with the blood of gallant soldiers . . . . .

THE PAKENHAM OAKS . . . . .



SPRING-TIME IN THE SWAMP . . . . .

. . . . . wildflowers burgeon forth in brighter hues . . . the mating call of wild animals is heard . . . all around are the works of Nature in her most exalted mood . . . . .

SPANISH MOSS . . . . .

. . . . . the pale moon casts her magic spell over this woodland scene, witches' hair hanging from the trees . . . one imagines a dance of pixies, advancing and retreating into the shadows . . . . .

Lovely Louisiana

LAKE SALVADOR .....

..... showing through a silhouette of bald cypress, this lake is typical of a thousand bodies of water that indent the Louisiana coast . . . formed by the moving delta of the Mississippi, the history of man but a brief moment in the Time of the River .....

A Survey of the Louisiana Fresh Oyster Industry

By
Geo. H. Seferovich

PART II

DEMAND ASPECTS

In general, there is no correlation between climate and consumption. Neither proximity to producing areas, composition of population, nor industrial structure seem to have any great effect on consumption. The primary factor seems to be taste. In a survey of the market for fresh oysters in fourteen sample cities of the United States, conducted by the United States Bureau of Fisheries, it was found that 77% of the consumers purchased because of taste, while only 6% of the non-consumers claimed that the price was too high. The reasons given for consuming oysters were: taste, food value, ease of preparation, and no waste, in the order named. Price, within a certain range, has a slight effect on the units taken by those who have cultivated a taste for oysters. On the other hand, price definitely affects the units taken by those who, not yet accustomed to regular consumption, still consider them a semi-luxury. There are more people in this latter category. It can be said, therefore, that price does affect the number of units taken.

The average per capita per annum consumption of those who consumed oysters in the fourteen sample cities was 4.2 pounds or almost one Louisiana bushel. Twenty-five percent of the housewives who purchased oysters served them 35 times a season or about once a week for eight months of the year. Twenty percent served them 8 times and ten percent served them 16 times a season. Only three housewives served oysters every other day or 122 times a season. The most common unit purchase was one pint or approximately one pound which costs about 45 cents. Seventy-eight percent of the housewives served them for dinner, seventeen percent for lunch, and three percent for supper.

The retailers in the sample cities claimed that consumer preference tended toward bulk or unpacked oysters. Less than 20% of the stores carried brand name oysters. Almost half of the retailers, however, thought that consumers preferred brand name oysters.

The Oyster trade was found to be highly seasonal. The bulk of the sales occur between November and February. Retail sales are usually heaviest on Thursday, Friday, and Saturday.

The average retail prices for fresh oysters were: 23 cents a half pint, 45 cents a pint, 86 cents a quart, and $3.08 a gallon. Live oysters in the shell sold for 26 cents a dozen. In some cities oysters were sold by the count at 75 cents for eighty oysters or approximately one quart.

In general, oysters were purchased for cooking purposes. Fifty-two percent of the housewives served them in stew, while only fifteen percent served them raw. Only 15 of the 98 recipes were used in preparing them, and 95% of the consumers prepared them in only 7 different ways.

This is the second of a series of selected articles on the Louisiana oyster industry by Mr. Seferovich, whose M.B.A. thesis at L. S. U. College of Commerce furnished the material sources.

CONSUMPTION IN FOUR IMPORTANT MARKETS

Of the fourteen markets surveyed by the Bureau of Fisheries, four command our attention because of their geographical position. Louisiana is ideally located to serve the population west of the Mississippi River, and east of the Rocky Mountains. Those groups of states known as the west north central and the east and west south central constituting about 38% of the land area of the United States, containing about 30% of the population, and contributing approximately 22% of the retail sales of the nation, provide a tremendous potential outlet for Louisiana's oyster crop. Within this area there are four ideal central seafood markets: St. Louis, Kansas City, Oklahoma City, and Denver. Space does not permit going into detail concerning the individual consumer characteristics of each city, but tables III, IV, and V summarize the significant characteristics.

St. Louis is the greatest inland seafood market in the United States. The per capita per annum consumption of oysters in St. Louis amounts to approximately 1¼ Louisiana bushels, but only 30% of the consumers serve them raw. Oysters are usually served at dinner about once a month for eight months of the year.

The per capita per annum consumption by consumers in Kansas City amounts to approximately one half of a Louisiana bushel. Only 9% of the housewives who purchased oysters served them raw. About 94% of the housewives interviewed served oysters.

Fewer families consumed oysters in Oklahoma City than in St. Louis and Kansas City. The per capita per annum consumption being about the same as that of Kansas City. Fewer families consumed oysters in the raw state than in the other two cities.

Three fourths of the families interviewed in Denver consumed oysters, their per capita per annum consumption amounting to approximately two-thirds of a Louisiana bushel. The frequency of serving was about the same as in St. Louis, but only about 13% of the housewives who purchased oysters served them raw.

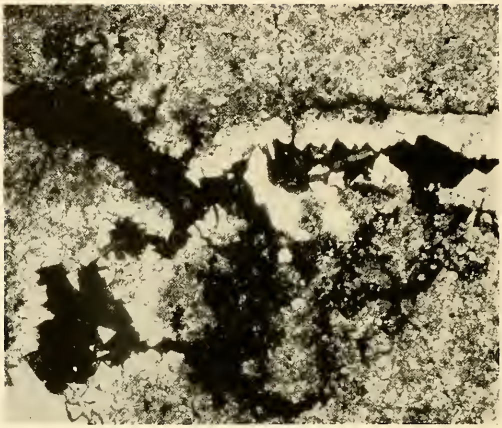
Of the 1,393 families interviewed in the fourteen markets canvassed, 1,209 or 86.8% were consumers; these consuming families purchased 25,306 pounds a year or about 17.6 pounds a family.

If the percentage of consumers among the families canvassed in St. Louis, Kansas City, Oklahoma City, and Denver is applied to the cities as a whole, and if the per capita per annum consumption is applied to the percentage of consumers in the cities, a rough approximation of the market for fresh oysters in these cities can be obtained. If it is assumed that the percentage of families consuming oysters in the raw state always consumed them in this form, then the market for raw oysters can be roughly approximated. It is essential, however, that the limitations of these assumptions be fully considered. The bias existing in the assumptions will tend toward a high actual consumption when the percentage

[Turn to Page 43.]

The Origin of Cap Rock

The Department Publishes a Comprehensive Report Entitled, "Origin of The Cap Rock of Louisiana Salt Domes," With Special Reference to Origin of Sulphur.



■ Sulphur veins (black) in Calcite (white and gray) as a thin rock section of a specimen of the cap rock appears under a petrographic microscope.

The study entitled "Origin of Cap Rock of Louisiana Salt Domes," was prepared by Dr. Ralph E. Taylor, Geologist, for the Research Division of the Louisiana Geological Survey and Louisiana State University. This 191-page report dealing with the origin of the cap rock that overlies many of the Gulf Coast salt plugs is a result of a number of years of work in collecting all available data concerning the occurrence of both the cap rock and the salt combined with intensive study of many well cores and other specimens. Some 300 thin (rock) sections cut from these specimens were studied in detail with the petrographic microscope.

While this report is of most interest and value to those scientists who are chiefly concerned with the petroleum, sulphur, and salt industries of the Gulf Coast region, certain chapters will no doubt interest the general public. The following discussions have been taken directly from Mr. Taylor's report.

INTRODUCTION

There are 138 proved salt domes in that part of the Gulf Coast region of North America extending as a broad belt from the Rio Grande River on the west to a little beyond the Pearl River on the east. To date, 70 of them have been discovered in Louisiana, 54 in the southern part of the State and 16 in the northern part. These salt domes are very like those which occur in Mexico, Germany, Russia, Roumania, Persia, Northern Africa, and other parts of the world. They are localized domal anticlines, formed by the intrusion from sedimentary beds, usually at great depth, of roughly cylindrical plugs of rock salt. The salt plugs usually have a diameter of a little less than a mile and occur at depths ranging from a relatively few feet, as at Avery Island, La., to nearly 9,000 feet, the depth to salt at Henderson, La. The existence of still deeper ones is indicated by geophysical data.

Many of the salt plugs, particularly the shallower ones, are immediately overlain by bodies of rock, most of which is quite well indurated, known as salt-dome cap rock. Although this cap rock, in most cases, lies beneath a covering of unconsolidated sediments, it appears at the surface at Winnfield and Pine Prairie, La., and at Gyp Hill, Tex., and is associated with indurated sediments in north Louisiana and in east Texas. It is quite irregularly distributed over the upper portion of the salt, and its thickness varies from a relatively few feet at Vermilion Bay, La., to over 1,000 feet at Sulphur, La. The composition of cap rock also shows considerable variation, although its chief constituent in most cases is a coarsely crystalline anhydrite of quite distinctive appearance. In many of the salt domes this anhydrite, that lies immediately above the salt, is overlain by cavernous, rather coarsely crystalline, calcite. Where the depth is not too great, gypsum may be associated with, or may occur between, the anhydrite and calcite. Commercial deposits of native sulphur have been found within the lower part of the calcite cap rock at a few of the salt domes. Several additional minerals, chiefly sulphates, sulphides, and carbonates, are commonly present. The cap rock is unfossiliferous, so far as is known, although fossils occur in the false cap rock, a zone of calcite cementation in the sediments adjacent to the cap rock.

At the present time, salt-dome cap rock supplies the greater part of the world's sulphur and is also a source of oil and "limestone." It has received considerable attention not only because of its economic importance, but also because of the interesting geologic problems associated with its occurrence. The presence of these bodies of hard rock in regions of otherwise unconsolidated rocks, their definite association with the salt, their varied mineral content, and other characteristics, have been subjects of much interest to geologists.

Although several attempts have been made to explain the origin of cap rock, the problem has not as yet been definitely solved. The presence of the anhydrite is usually accounted for in one of two ways: (1) it is a detached block of sedimentary anhydrite brought up on top of the salt; and (2) it is residual material which accumulated as a result of solution of the salt, in the same way that the "gypsum hat" of the German salt domes has been formed. The minerals other than the anhydrite have been explained as being either a part of the original sedimentary sequence, or as alteration products of the anhydrite.

This study of the cap rock of Louisiana salt domes has been made with the hope of obtaining further data on the geology and origin of these interesting and important bodies. It has included the petrographic examination of both the salt and the cap rock in order to determine their relationship, and particular attention has been given to sulphur-bearing cap rock. For purposes of comparison, salt and anhydrite of known age have also been studied.

SUMMARY OF THE DISCUSSION OF THE SALT

Rock salt in the salt plugs of Louisiana salt domes is of sedimentary origin and is similar in composition to that of other rock-salt deposits. The structure of the salt is similar to that of other salt-dome regions. Light- and dark-gray bands are arranged in isoclinal folds that were formed at the time of intrusion of the salt. Where cap rock is present, these folds are usually abruptly decapitated by the relatively flat "salt table." The salt is composed of interlocking grains of halite, ¼ to ½ inch in diameter, that frequently show considerable shearing and recrystallization. The light- and dark-gray layers or "bands" apparently are "year rings" resulting from periodic changes in conditions during salt deposition. This is indicated by the difference in their composition; the darker bands contain appreciably more grains of disseminated anhydrite. These anhydrite grains, as well as a number of much less abundant minerals, are contemporaneous in age with the salt, having been formed by precipitation from solution at the time that the salt was being deposited. These minerals are only very slightly soluble in water and hence constitute the water-insoluble residue of the salt. Anhydrite, as crystals and cleavage fragments ranging in size from fine to coarse sand, comprises nearly 99 percent of these residues, associated with the following minerals, listed in order of abundance: dolomite, as rhombic crystals with distinctive nuclei, many of which are zoned; calcite; pyrite; quartz, as crystals and as rosettes with nuclei; limonite; hauerite; hematite; celestite; sulphur, barite; marcasite; kaolinite; magnesite; danburite; hilgardite; boracite; and possibly gypsum. The amount of these residues is quite variable, but probably averages from 5 to 10 percent for Gulf Coast salt in general, and is higher at a few of the salt domes. In different parts of the same salt plug, the amount of residue may vary from less than one percent in the light bands, to nearly 90 percent in certain lenses ("slab" anhydrite). The salt also contains lenses and pockets of detrital sand, fragments of sandstone and shale, disseminated grains of detrital minerals, "mother" liquor (brine), petroleum, and gases (nitrogen, carbon dioxide, methane, and hydrogen sulphide).

The minerals of the water-insoluble residues are distinctive, and differ strikingly from the mode of occurrence of these minerals in sediments. The grains in the residues are unusually large, particularly in the case of the anhydrite and dolomite. The unusual size of the grains or crystals of these minerals is not surprising, however, when it is considered that they crystallized from sea water at a stage in the evaporation when their rate of precipitation had passed the maximum point, hence they crystallized more slowly and grew to a larger size. Other distinctive features of the minerals in the residues are the nuclear and zoned rhombs of dolomite, the quartz rosettes with nuclei, and the perfection in crystal development of most of the minerals.

The detrital materials also appear to be distinctive, i.e., different from the sediments surrounding the salt plugs.

REGARDING THE CAP ROCK IT CAN BE SAID THAT:

1. The occurrence of cap rock is confined to salt domes and it has been found at most of the known salt domes of the Gulf Coast. It cannot be considered as definitely missing at any of the salt domes, as in every case where it is not reported exploration has not been complete.

2. Cap rock is highly variable in development and thickness, attaining the greatest thickness at shallow salt domes, yet being unreported at a few of the very shallow ones. It ranges in thickness from a few feet to more than 1,000 feet.

3. The greatest thickness of cap rock overlies the central part of the salt plug in most cases, although exceptions are common. It extends down the flanks of some salt plugs as much as 5,000 feet. Overhang of cap rock is developed at a few salt domes.

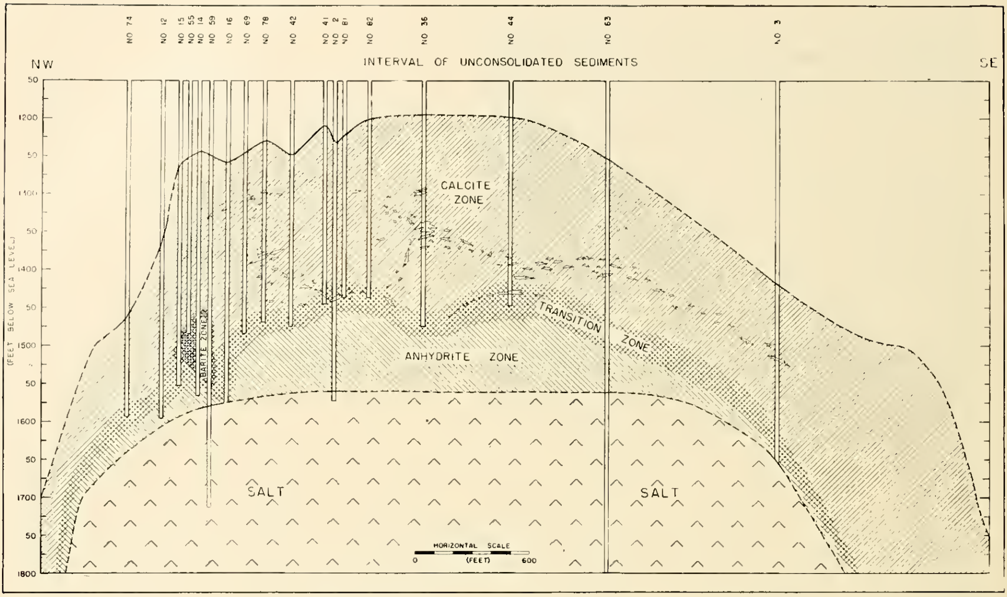
4. A zone of calcite-cemented sediments, the false cap rock, separates the surrounding sediments from the cap rock proper. The sediments adjacent to the cap rock are highly faulted and steeply dipping at many of the shallow salt domes, owing to upthrust of the salt and to collapse of the cap rock. In some cases the sediments that directly overlie the cap rock show a small amount of uplift, and on a few domes they are depressed. These sediments in most cases, however, are not so steeply dipping, and not so far removed from their normal stratigraphic position, as those at the sides.

5. The cap rock is highly brecciated and sheared, with the deformation slight or wanting at the salt-anhydrite contact, and becoming increasingly pronounced upward. Most of the breccia fragments are of cap rock from a portion overlying that in which they are found; fragments of false cap rock occur in the upper part.

6. The chief constituents of cap rock are anhydrite, calcite, gypsum, and sulphur, in order of abundance, with some 20 rarer minerals often present. Anhydrite is always present, and in some instances is the only mineral present in any abundance.

7. Cap rock is in no sense a bedded deposit but consists of zones that are usually of very irregular distribution. Three zones—the anhydrite zone, the transition zone, and the calcite zone—are present, with very few exceptions, wherever a considerable thickness of cap rock is developed. The anhydrite zone is the lowest zone; it grades irregularly into the transition zone (the zone of alteration), which is characterized by gypsum, calcite, and sulphur. The calcite zone irregularly overlies the transition zone and may contain variable amounts of gypsum and sulphur, as well as remnant grains and isolated blocks of

■ Enlargement to 60 times of area in lower left hand corner of the figure on page 36 as shown under a petrographic microscope.



■ **Northwest-southeast cross section of the cap rock of Lake Washington salt dome, Plaquemine Parish. Small blank areas represent cavities, dotted areas represent sandy portions of the cap rock. Some of the data for this section have been taken from the records of wells just off the line of cross section. Sulphur is being produced from the cap rock of this salt dome by the Freeport Sulphur Company.**

anhydrite. The cap rock of the flanks may contain only the anhydrite zone, or may contain all of the zones of the main body.

8. The salt-anhydrite contact is cavernous in most places and has associated brines which carry anhydrite sand of the same type as that found in the salt. Some anhydrite in direct contact with the salt is saturated with salt, and is composed of loosely packed anhydrite sand, like that in the salt, that has undergone very little cementation and intergrowth or shearing. The fairly massive anhydrite cap rock with "pile-of-brick" structure is also found at the salt-anhydrite contact.

9. Upward from the salt the anhydrite grades into the typical, fairly massive saccharoidal anhydrite that is distinctive of cap rock. It is composed of the same minerals as the loosely compacted anhydrite, but the grains have become sheared and intergrown. Banding occurs along the predominant horizontal shear zones where secondary pyrite, carbonaceous matter, calcite, and sulphur have been deposited.

10. Dolomite rhombs and quartz crystals and rosettes occur throughout all three zones. In the anhydrite zone, they have about the same relative abundance that they do in the water-insoluble residues of the salt. Although the dolomite rhombs are sometimes fragmented, and many are replaced by calcite, they are so distinctive that their identity is usually evident. These minerals are identical in appearance and properties with those in the salt, even to the character of the inclusions and zoning. Dolomite rhombs occur in primary, sedimentary anhydrite, but apparently only as minute grains, quite different from those in the cap rock and salt.

11. The anhydrite grains in cap rock are also identical with those occurring in the salt, but differ strikingly from those occurring in beds of primary sedimentary anhydrite.

12. Sulphur and calcite directly and completely replace the anhydrite, and in general are closely associated. The replacement increases in amount upward toward the transition zone, where gypsum appears in considerable amounts, altering from the anhydrite. Calcite and sulphur replace both the anhydrite and gypsum in the transition zone, in many cases retaining remnants of the replaced minerals. The quartz rosettes and dolomite rhombs associated with the anhydrite retain their identity during alteration of the anhydrite, and with the "pile-of-brick" and banded structure of the anhydrite that are locally preserved, form distinctive features of the cap rock of the transition and calcite zones.

13. Cap rock of the cavernous transition and calcite zones has undergone intensive brecciation and resolution, with subsequent recementation and secondary deposition. Sulphur has been replaced by calcite, gypsum, pyrite, barite, and celestite. The secondary calcite and sulphur represent a number of generations.

14. Appreciable amounts of petroleum, natural gas, and hydrogen sulphide occur in cap rock. These appear to be more abundant where calcite and sulphur are present, but sulphur does not always occur in appreciable quantities wherever these substances are found.

SUMMARY AND CONCLUSIONS REGARDING THE ORIGIN OF THE CAP ROCK

The anhydrite cap rock of the salt domes of the North American Gulf Coast region is a residual accumulation of the relatively water-insoluble materials in the rock salt of the associated salt plugs. The following evidence points to this conclusion: (1) the relatively flat-topped salt table, present at many salt domes, decapitates all of the isoclinal folds in the salt except those that are more resistant to solution, and these project up into the cap rock; (2) brine, with associated salt residue, occurs at the salt-anhydrite contact; (3) the minerals of the salt residues can be traced into the overlying cap rock; (4) the development of the anhydrite cap rock has been established as progressing from the salt-anhydrite contact upward; and (5) the anhydrite of cap rock has been found by comparison to be identical to the anhydrite in the salt and distinctly different from that of primary, bedded deposits.

The amount of residue in salt and the amount of salt available in salt plugs is sufficient to allow formation of the thicker cap rocks. The variable thickness of cap rock is due to conditions of accumulation, total amount of salt dissolved, and the amount of residue in the salt. Absence of cap rock at shallow salt domes is not due to lack of residual material in the salt, but to recent upthrust or to conditions unfavorable to accumulation. Typical horizontal and other banding is due largely to the deposition of secondary minerals along shear planes or zones. Some of the horizontal banding, particularly that in the anhydrite near the salt contact, may be due to differences in composition of the salt, and to periodicity of accumulation.

The gypsum, calcite, and sulphur of cap rock have been formed by alteration of the anhydrite. The transition zone, in which the anhydrite has been altered to gypsum, calcite, and sulphur, apparently comes into existence after a considerable thickness of anhydrite has accumulated, and works from the top of the cap rock downward. Altering solutions can enter from the flanks, or laterally, and probably consist of petroleum and hydrogen sulphide, so that appearance of the transition zone may be coincident with the entrance and accumulation of hydrocarbons. Alteration is most active in the transition zone and probably consists of reduction, with attendant or subsequent oxidation. The actual steps possible are reduction of the anhydrite in the presence of excess hydrogen sulphide, with oxidation of the hydrogen sulphide either immediately, or later, following migration of the hydrogen sulphide to a part of the cap rock where oxidizing conditions exist. Calcite could be formed by the reaction of calcium hydroxide, formed at the time of the reduction, with carbon dioxide derived from ground water. Cultures of bacteria may cause the alteration, but bacteria are not known to occur in cap rock, and the environment under which reduction has occurred is one that would not be favorable to the activities of known bacteria.

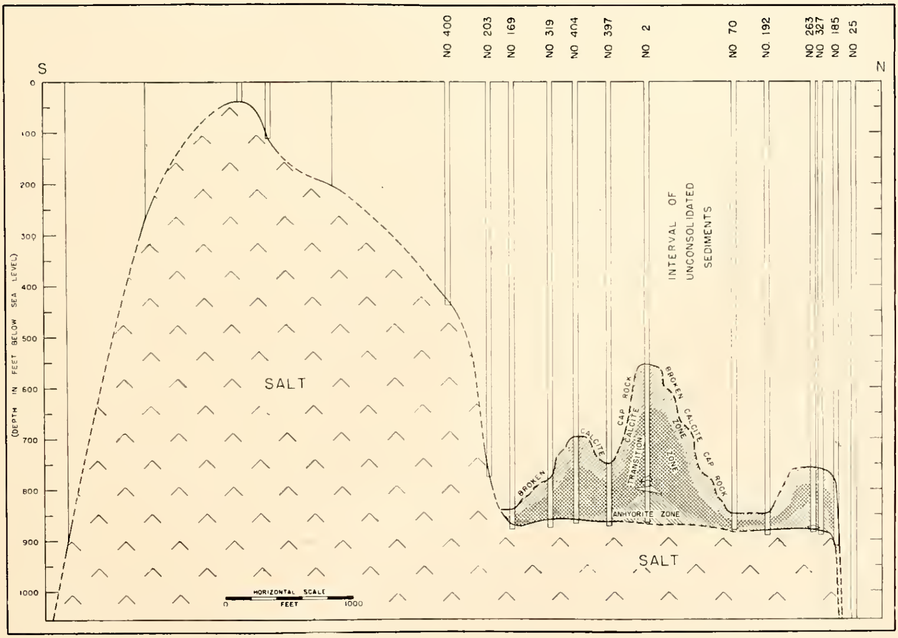
The author also discusses the three economically important cap rock products of sulphur, petroleum, and limerock.

◆

MOTHER CAREY'S CHICKENS

Mother Carey's Chicken is the Wilson Petrel, a small sea-bird of unusual interest. It occurs regularly on the Louisiana coast during the summer months. Wilson petrel is remarkable in that it nests during the winter in Antarctic islands, the nests being constructed in burrows under the ground. The birds come north during the summer and spend the time wandering in search of food over the ocean surface.

Its names are also remarkable in their origin, "Petrel" coming from St. Peter since like St. Peter it appears to attempt to walk on the water. Mother Carey's Chicken comes from Mater Cara, an old appelation for the Virgin. The technical name for the petrel well expresses its marine character, **Oceanites oceanicus.** The bird, dark colored and about seven inches long, has a peculiar irregular flight.



■ **North-south cross section of the cap rock of Jefferson Island (Lake Peigneur) salt dome. Small blank areas represent cavities. The upper part of the calcite zone is very sandy, but sandy portions are not distinguished in the diagram. Some data for this section have been taken from the records of wells just off the line of cross section. Sulphur was mined from the cap rock of this dome by the Jefferson Lake Oil Company.**

■ **Too swift for a boat, too deep for wading, and with overhanging trees and bushes to entice your lure. Headwaters of Bogue Falaya River near Ramsay, La.**

WHERE TO FISH IN LOUISIANA

•

For the Southern Smallmouth Bass

•

By
Percy Viosca, Jr.

Water churn, and rush, and bubble:
Take the rock bass eye in double,
Fillet of a walleye pike,
Head of smallmouth bent to strike
And tail thereof for swiftest swim;
Of striped bass the belly skin;
Lateral stripe of largemouth bass,
Warmouth's pluck, but thrice as fast;
Grayling's love of swiftest water,
Pikes' voracious love of slaughter;
Enough of vim and rush to flout
The fighting finesse of a trout.
Water, water, rush, and bubble:
Such a fish is meant for trouble.

With apologies to Bill Shakespeare.

Perhaps the least known of the finer game fishes inhabiting Louisiana waters is the southern smallmouth black bass. Always lurking behind some log, root or other obstruction near swift water, it is ready to dart after its prey, seize it with a firm hold, and return as rapidly to the refuge from whence it came. Here, the prey, crippled by the comb-like teeth, is swallowed more leisurely or, if insecurely held, may be released and snapped up again in a grip more convenient for the act of swallowing.

Less headstrong but more pluck, less inertia but more agility, less bulk but more streamline, less bulldog but more whippet, it is the bass antonym of the largemouth. With these qualities it is more at home in the meandering, spring-fed streams of the pine lands than is the largemouth. Here they lurk under each log, stump or root, and if you hook one in a creek filled with brush, logs, tree tops, roots and cypress knees, you will have a treat in store for you. And if you are lucky enough to land one you will have something to tell about when you get home, especially if it tops the scales at two-and-a-half pounds, for two-and-a-half pounds of this smallmouth under these circumstances is more fight than seven pounds of largemouth bass in open water.

THE SMALLMOUTH HABITAT

Both species of native black basses sometimes inhabit the same streams. In the swifter meandering headwaters, with deep holes alternating with bars of gravel and coarse sand, the smallmouths hold sway. In the lower flood plains and deltas, where only clays and silt are carried, largemouths alone are found. But where the streams first begin to widen and deepen and the current first slackens perceptably; where the bars are large and sloping and consist chiefly of fine sand and silt, overgrown with willows; or where the current makes a long broad sweep against one bank and leaves a lily patch on the other, and deep oxbow lakes are the rule—both species are found. Even here, however, they are not in keen competition, each keeping to his own favorite habitat. Where the current, however slack, sweeps against the bank, we find the one; where there is a large dead-water area, as on a flat covered with cow lilies, we find the other. If, even in the swiftest section of the stream there is an occasional oxbow lake, all one can catch in the lake are largemouths; in the stream, smallmouths.

The eyes of the southern smallmouth bass are noticeably larger than those of largemouth. This character suggests that it may habitually seek its prey in deeper waters. Deep fishing as a rule brings a larger string of bigger fish than surface or fly casting, especially if the lure is allowed to play around sunken logs near the bottom. The eye of this species has a brilliant pinkish cast which permits the angler to recognize it as soon as it is brought to the surface of the water.

■ We find them always lurking near swift water, ready to dart after their prey. The Calcasieu River near Oakdale, La.

Except for the occasional exception which proves the rule, the expert angler can usually tell which species he has hooked, even when fishing in a section of stream where both are found. The rush and strike usually without breaking water, the darting to and fro in the swift current, the effort to snag your line around a sunken log or to disappear in a deep pool, all make up a fish story different from that of the largemouth bass. Furthermore, these smallmouths are much more cautious and shy, especially in clear water, and do not possess that curiosity to investigate a new lure, which is frequently so fatal to the largemouth. Is it any wonder that there is a special class of first rate anglers that are for him heart, soul, and fish hooks?

CONFINED TO UPLANDS

The southern smallmouth is not normally found in the lakes and bayous of our alluvial lands, nor in the more sluggish portions of our rivers. It does not enter the tidal estuaries or deltaic distributaries as does the largemouth. It is confined therefore to the three upland zones of Louisiana: the Florida Parish uplands, the West Louisiana uplands, and the Central and North Louisiana uplands. Here it prefers the mature type of meandering stream consisting of broken down and worn rock in the form of gravel, sand, and silt. There is relatively little aquatic vegetation in these streams. Where bayous and backwaters, with little or no current and characterized by water weeds, are formed, this species is replaced by the largemouth. In the Florida Parishes smallmouths have been taken in the swifter portions of the Pearl, Tchefuncta, Tangipahoa, Tickfaw and Amite Rivers and their tributaries. In west Louisiana, the upper Calcasieu and Sabine and their tributaries and several swift creeks in the Red River drainage are the favorite haunts of the species. In the Central and North Louisiana area they are found in the swifter tributaries of the Ouachita, Little and Red Rivers. In streams like Bayou Lacombe, Bogue Falaya River and Bayou Dorcheat, which have swift intermediate sections but are swamped above and below, it is not surprising to find a nice colony of smallmouths in the swift section, but only

■ Near the old swimming hole in a clear creek is always a good place to cast your lure. Big Creek near Pollock, La.

■ **If you hook one in a creek filled with brush, logs and tree tops, you will have a treat in store for you. Little Bogue Falaya River above Covington, La.**

largemouths at the swamped headwaters and lower reaches.

What we know as swift streams in Louisiana are of course relatively slow when compared to the almost straight, rapid mountain streams of other states, characterized by boulders and cataracts. In such streams the common smallmouth bass known to anglers in the North makes its most southerly salients. The nearest approaches of the northern species to Louisiana are in the mountains of Arkansas and in the Tennessee River Drainage area of Northern Alabama. Because we do not have any such streams, and of course no cold glacial lakes, we need not expect to ever catch a northern smallmouth in this state.

Instead we must look for the southern smallmouth in the deeper waters of meandering streams, where trees overhang the bank or around sunken logs and fallen tree tops. As these often bite best late in the fall, or even in winter if the water is not too muddy, they are frequently called "winter trout" in Louisiana.

* * *

The skunk is less prolific in Louisiana than in more northern and eastern states. An average of 40,000 to 45,000 skunk pelts are taken annually.

FIFTY-FOUR SPECIES OF TREES IN TCHEFUNCTE PARK

The Division of Forestry of the Department of Conservation has recently completed a check on the various trees to be found on the Tchefuncte State Park in St. Tammany Parish.

This area is a natural laboratory for the layman as well as the scientist to study the various species of tree life, of which there are fifty-four different species. The list will be increased later through a study of the shrubs as well as the wild flowers.

The park is accessible to the public, as the concrete highway from Slidell to Covington passes through the middle of the area—which is dedicated for recreation and the development of the natural resources, including wild life and forest products.

The following species are listed by the Forestry Division:

Longleaf Pine, Slash Pine, Loblolly Pine, Spruce Pine, Cedar Pine, Bald Cypress, Black Willow, Wax Myrtle, Sweet Gale, Hickory, Blue Beech, Hornbeam, Ironwood, Hop Hornbeam, River Birch, Beech, Chinquapin, Black Oak, Yellow-bark Oak, Red Oak, Swamp Spanish Oak, Black Jack, Scrub Oak, Water Oak, Willow Oak, Live Oak, Post Oak, White Oak, Cow Oak, Basket Oak, Winged Elm, Hackberry, Red Mulberry, Bois d'Arc, Osage Orange, Bow Woo, Magnolia, Sweet Bay, Swamp Bay.

LIMEROCK

Limerock is quarried by the open pit method from the cap rock of two salt domes in Louisiana. A plant for crushing the limerock at the Winnfield salt dome, Winn Parish, has been in operation for some thirty years.

■ **Wherever the current sweeps against the bank, cutting a deep channel, we find them hiding under roots and stumps. The Tangipahoa River at Carpenter's Landing.**

■ **A meandering spring-fed river with a sandy bottom, the type of Louisiana stream dominated by the southern smallmouth bass. Big Bogue Falaya River above Covington, La.**

A Survey of the Louisiana Fresh Water Industry

[Continued from Page 35.]

of consumers in the sample is projected for the group as a whole. But this tendency toward overestimating the actual market will be offset by underestimating the potential market since, under present conditions, the per capita consumption amounts to only a half pint a month for eight months. This represents an expenditure of about 23 cents a month or $1.84 a season.

ESTIMATE OF POTENTIAL CONSUMPTION

Under these assumptions the four cities together with their trading area would consume annually about 4,000,000 bushels. Not including the trading areas, these four cities would annually consume 1,500,000 bushels. Raw consumption alone would take approximately 63% of the amount of oysters marketed by Louisiana firms in 1934 if trading areas were considered. See Table VI.

Although almost everyone constitutes a sales outlet for oysters, from 10% to 33% are non-consumers in large cities, and in towns under five thousand, a still greater percentage are non-consumers. Taste is the dominant motive for consuming. The real issue seems to be acquaintance or non-acquaintance with this healthful article of food.

Because of two factors inland peoples, other than those in large urban centers, have been unable to cultivate a taste for oysters: first, the relatively restricted producing areas and, second, inadequate transportation and preservation facilities. Rapid freight, express, and refrigerator motor trucks, in conjunction with improved packing and the rapid freezing process, enable this perishable product to enter almost any market in any season in prime condition. Production, although subject to the same uncertainties as agricultural crops, can be increased. The problem at the present time is to create consumer demand.

CONSUMER DEMAND IN SMALL TOWNS

Until the potential consumers in the smaller towns consume oysters regularly, the price will be too high to encourage quantity consumption. As long as the price remains relatively high, quantity consumption will be discouraged, and as long as quantity consumption is discouraged, prices will remain high. Consumer demand in small towns is so uncertain, and oysters are so perishable, that merchants in small towns handle

TABLE III[1]
BUYING HABITS OF FAMILIES IN FOUR CITIES

CITY	BUYING MOTIVES OF FAMILIES[2]						Percent Purchasing By Brand Name[4]	Percent Preferring to Purchase in Bulk[5]	Percent Preferring to Purchase in Unit Packages[6]
	% AFFIRMATIVE			% NEGATIVE					
	Taste	Food Value	Easy to Prepare	Taste	Food Value	Price			
DENVER	65.8	29.6	17.6	27.8	.9	1.8	13.7	86.8	13.2
OKLAHOMA CITY	69.6	67.4	50.0	26.1	2.2	......	40.5	48.8	51.2
KANSAS CITY	85.6	57.7	7.7	1.9	......	27.9	69.3	87.3	12.7
ST. LOUIS	79.6	26.2	5.8	[3]	[3]	[3]	56.7	99.2	18.0

NOTES: [1] Extracted from J. M. Lemon, *The Market For Fresh Oysters in Fourteen Cities of the United States*, U. S. Dept. of Comm., Bureau of Fisheries, Fishery Circular 3, Wash: Govt. Print. Off., 1931.

[2] Table 4, p. 21. More than 1 reason given, therefore % do not total 100.

[3] All families interviewed were consumers.

[4] Table 5, p. 21.

[5] *Ibid.*

[6] *Ibid.*

TABLE IV[1]
CONSUMING HABITS OF FAMILIES IN FOUR CITIES

CITY	% Week's Sales[4]			% of Families Serving For[2]			% of Families Serving No. Times a Season[3]		
	Thursday	Friday	Saturday	Dinner	Lunch	Supper	Two	Four	Eight
DENVER	33.22	28.33	13.89	63.9	15.7	2.8	......	......	50
OKLAHOMA CITY	14.67	31.50	30.33	71.7	19.6	......	13.9	......	19.4
KANSAS CITY	21.40	24.80	18.50	92.3	8.7	.9	18.4	12.2	15.3
ST. LOUIS	19.73	21.09	22.00	84.5	13.6	......	......	......	38.9

NOTES: [1] Extracted from J. M. Lemon, *op. cit.*

[2] Table 8, p. 23. Families serve at more than 1 meal, therefore % do not total 100.

[3] Table 6, p. 22.

[4] Table 3, p. 20.

TABLE V[1]
FAMILY CONSUMPTION IN FOUR CITIES

CITY	Percent of Families Consuming[2]	Per Capita Consumption of Families Pounds[3]	PERCENT CONSUMED IN THE FORM OF[4]			
			Stew	Soup	Fried	Raw
DENVER	75.0	2.9	34.3	25.9	20.4	13.0
OKLAHOMA CITY	78.3	2.4	17.7	21.7	47.8	6.5
KANSAS CITY	94.2	2.5	76.0	2.9	74.0	8.7
SAINT LOUIS	100.0[5]	5.3	61.2	......	15.5	29.1

NOTES: [1] Extracted from J. M. Lemon, *op. cit.*, following tables:

[2] Table 9, p. 23.

[3] Table 0, p. 24.

[4] Table 7, p. p. 22. Families consume in more than one way, therefore % do not total 100.

[5] Obviously overstated, hence, in computing table, arbitrary percentage of 95 was used.

TABLE VI[1]

SOME MARKET POTENTIALS FOR FRESH OYSTERS

CITY AND TRADING AREA	No. Families[4]	No. People	No. Consumers	TOTAL POTENTIAL CONSUMPTION		POTENTIAL RAW CONSUMPTION	
				Pounds	Bushels[2]	Pounds	Bushels[2]
ST. LOUIS—CITY ONLY	214,855	880,906	836,861[3]	4,435,363	1,031,480	1,290,691	300,161
ST. LOUIS AND TRADING AREA	484,252	1,985,433	1,886,161	9,996,653	2,324,803	2,909,026	676,518
KANSAS CITY—CITY ONLY	108,641	434,564	409,359	1,023,398	238,000	89,036	20,706
KANSAS CITY AND TRADING AREA	329,112	1,316,448	1,240,094	3,100,235	720,985	269,720	62,726
OKLAHOMA CITY—CITY ONLY	47,133	202,672	158,692	380,861	88,572	24,756	5,752
OKLAHOMA CITY AND TRADING AREA	117,900	506,970	396,958	952,699	221,558	61,925	14,401
DENVER—CITY ONLY	79,351	325,339	244,004	707,612	164,561	91,990	21,393
DENVER AND TRADING AREA	218,132	894,341	670,756	1,945,192	452,370	252,875	58,808
TOTAL—CITIES ONLY	449,980	1,843,481	1,648,916	6,547,234	1,522,613	1,496,473	348,012
TOTAL—CITIES AND TRADING AREAS	1.149,396	4,703,192	4,193,969	15,994,779	3,719,716	3,493,546	812.453

NOTES: [1] Computed on Basis of Tables III-V.
[2] Louisiana Measure.
[3] Arbitrary 95%. For Reason See Table V, Note 5.
[4] *I. M. C., Basis For Sales Quota Making*, Hearst Magazines, International Magazine Company, 1935.

them only in small quantities on certain days of the week and then only during the holiday season. High price is the reason for restricted consumption, and restricted consumption is the reason for high price. Restricted consumption, the effect, becomes in turn a cause. This mutually reactive combination must be broken at the juncture of high price in order to start the circle turning in the opposite direction, **viz.**, low prices and increased consumption, increased consumption and low prices.

The oyster is not a regular article in the diet of families in large cities. It is in most cases considered a luxury or semi-luxury; an article fit for banquets, holiday feasts, and an occasional indulgence in a rare delicacy. This is upheld by the per capita consumption of consumers in the fourteen sample markets, which amounted to about a half pint serving each month during the eight-month season. This restricted consumption is certainly indicative of the consumers' opinion of the place of oysters in the diet. Since the consumers mentioned purchase oysters because they like them, their consumption can certainly be increased. Non-consumers can be introduced to this healthful food only through concerted effort on the part of the industry. Literature, samples, and other forms of consumer education will only increase the cost.

Oysters must be removed from the "rare delicacy" class. There is no sound reason for seasonal consumption. It must be made known that they are a common, healthful food, consumable throughout the year, and priced for the family budget.

A price in keeping with the family budget will be more conducive to increased consumption than expensive market development. Naturally, some developing work will be required to create a demand as well as to increase the consumption of present consumers. There seems to be but one alternative—reduction of price. Profits will have to be temporarily sacrificed.

At the present time consumers are demanding an oyster for cooking purposes. Therefore an oyster with a maximum solid content is needed to supply this demand. Consumers are not willing to pay for a highly cultivated oyster, which is destined, because of its appearance and flavor, for raw consumption. Some fruits are raised for different purposes, **e.g.**, raw consumption, canning, and cooking. Price tends to reflect the use to which it is put. It is the same with oysters. Price, and the purpose for which they are purchased, are determining factors in the marketing problem.

LACK OF ACQUAINTANCE WITH THE PRODUCT

In conclusion, then, the market for fresh oysters is restricted because of a lack of acquaintance with the product. This lack of acquaintance has been due to the inability to get the product to distant markets in prime condition. Although this major difficulty has been overcome, restricted consumption continues, causing a relatively high price. Oysters are considered a semi-luxury. They are served in only a few ways, usually in soup and stew. Therefore a full-bodied oyster with a maximum solid content is demanded by consumers. Cultivated oysters, designed for raw consumption, cannot compete on a price basis in this market. Oysters are served raw on the half shell or in cocktails by hotels and restaurants in the inland markets studied. Quality, and not price, is the chief consideration in this trade, but consumption is so limited that there is little prospect of expanding the market. Family consumption is the only possible direction in which a larger market for a quality oyster can be developed. The consumption of raw oysters by the families studied is so small at present that even if each family consumed raw oysters at every serving, this demand would still not amount to one-fourth of the potential consumption in the four markets analyzed.

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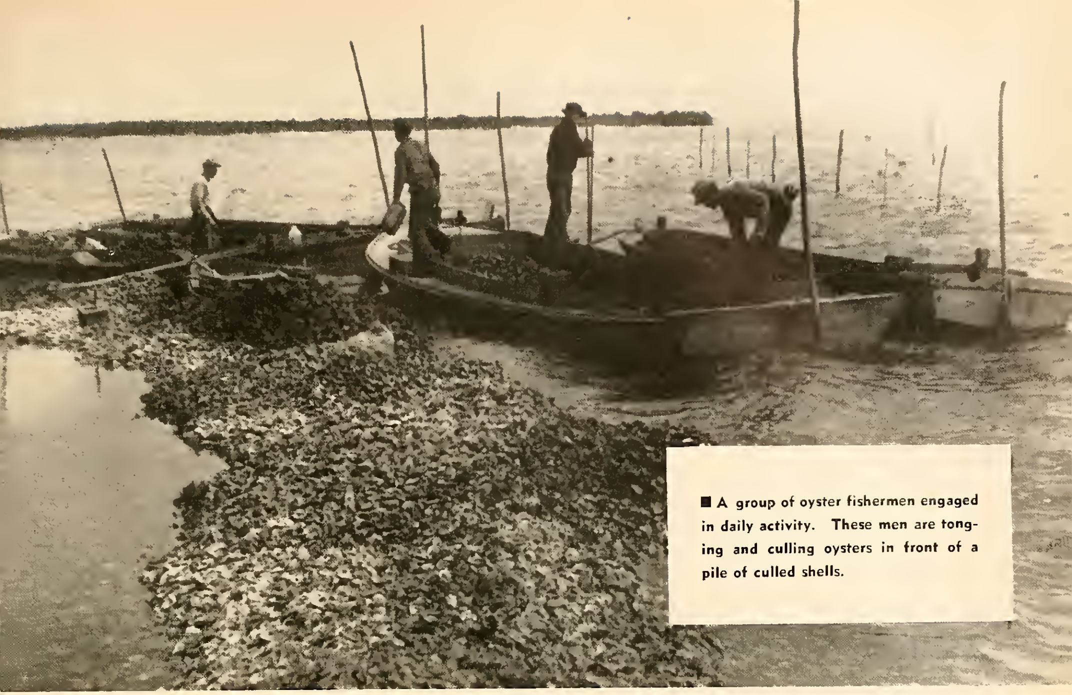
NATCHITOCHES PARISH

Field and laboratory investigations have been under way for the past year on a geological report of Natchitoches Parish by Mr. Justin Rukas, Geologist for the Geological Division. Lying in the central part of the State, this parish has many Tertiary formations exposed at the surface. The Angelina-Caldwell flexure crosses the parish. This parish lies west of Grant Parish, which parish has already been mapped, and west of Winn Parish, which is being mapped by Mr. Huner.



■ **A group of oyster fishermen engaged in daily activity. These men are tonging and culling oysters in front of a pile of culled shells.**

The Louisiana Seafood Industry

By Cassius L. Clay,

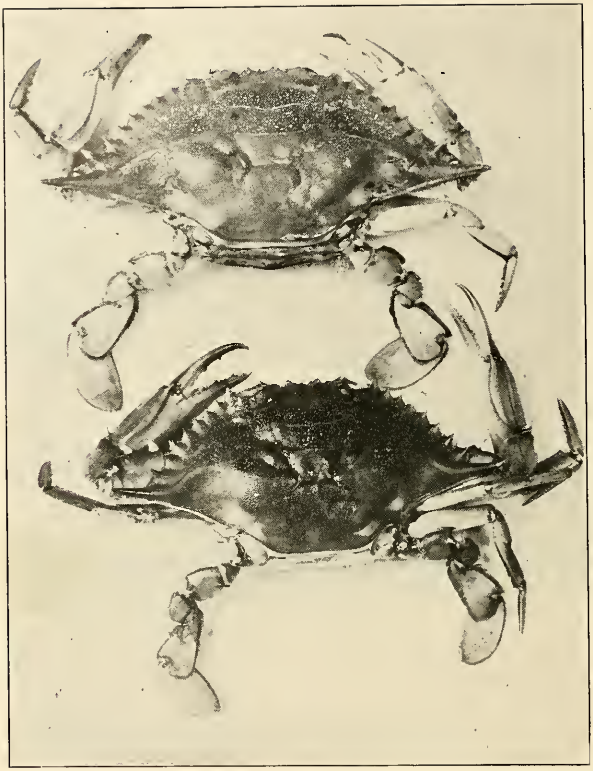
Louisiana State Analyst

Louisiana is fortunate indeed in that nature has provided her with an abunddance of tasty, healthful, and unexcelled seafoods in the form of shrimp, oysters, crabs, fish and others of some less importance. A discussion of the natural resources of Louisiana would be sadly incomplete if it failed to include some information concerning these important industries of the State.

Louisiana, and New Orleans in particular, have been noted for years as leaders in the nation when it comes to matters of French Cuisine and Southern Hospitality, and all of such is greatly dependent upon the deliciousness of the servings of Crabmeat Cocktails, Shrimp Remillard, Oysters Rockefeller, or just on the half shell, Pompano en Papillotte, and the many other famous seafood dishes, only too well known to the numerous visitors who have sojourned with us.

The supervision and development of our seafood industries has been directed along such lines as will tend to give to those more remote and isolated from the immediate vicinity of operations, products which are wholesome, clean, pure, and healthful. In this respect the industries are succeeding in a splendid manner.

Of the seafood industries of Louisiana, the salt water shrimp industry engages by far the greater number of people, and involves a much greater production of material, both in weight, volume, and money value than any of the others. Louisiana ranks first in shrimp fishing or trawling, the annual production at present being close to seventy-five million pounds, as compared with a production of ten million pounds in 1913, the industry having increased over sevenfold in the past twenty-five years. Louisiana fishermen catch over half of the shrimp taken in the United States and the products are valued at several million dollars annually. The shrimp industry dates back to early days, this food having served the early settlers. The records show the canning of shrimp as early as 1867, over seventy years ago, and by 1880 the production has increased to several hundred thousand cans a season. Today the seasons' pack runs into the millions, about one-half of the annual production, or thirty-five million pounds, being canned in 25 plants operating under State and Federal supervision. Shrimp are canned in three general styles, as wet pack and dry pack, that is with a salt brine or without, and also as peppered shrimp with red or green pepper seasoning. The packing processes have been developed and standardized in recent years, with the assistance of official agencies, so that canned Louisiana Shrimp are now as good or better



The blue crab.

than those purchased raw and cooked at home. However, for those who prefer, the industry has developed in the past few years, a pack of fresh raw headless shrimp, put up in one or five pound packages, to reach the housewife frozen in the fresh raw state. The demand for this product has been steadily increasing. Another form in which shrimp have been prepared for years, principally for export to China, is by sun drying. This is the first method of preservation that was practiced in the industry and was probably introduced into this country by the Chinese. The shrimp are thoroughly cooked in salt brine and then spread out on large wooden platforms to be sun dried, this process taking about three to four days. As in all industries, there are waste products and refuse which can be utilized in the shrimp industry, such utilization adding considerably to economic operation and increased profits. In the headlessing and picking of the shrimp for canning, sun drying or fresh frozen packing, about forty per cent of the entire weight is turned into waste or refuse. Some investigations have been made on this refuse material and there appears to be important possibilities as a result. The earliest utilization of this waste was in dried and powdered form as an ingredient of animal feeds and as a fertilizer. More recent investigations point to the possibility of using the dried hulls and heads in the preparation of special purpose paints. There are undoubtedly many more possibilities which will bear investigation. In the warmer weather it sometimes happens that shrimp trawl and freight boats run short of ice necessary to refrigerate the shrimp to prevent spoilage. Such cargoes are a complete loss for food purposes and it has been the practice to utilize such partially spoiled shrimp by drying and grinding for fertilizing purposes, for which it will bring from $25 to $30 a ton. An effort is at present being made to denature and preserve this shrimp rejected for food purposes so that it may be marketed as a bait for fishermen, when it should bring a much better return to the owner. Shrimp is an excellent fish bait and the market for such should be unlimited.

Next in importance to the shrimp industry, comes the crabmeat and oyster industries, with productions that are more or less equal in money values, each industry bringing to their respective operators approximately one and a half million dollars annually. Thirty years ago, according to the U. S. Census statistics, in 1908 the crabmeat production in Louisiana amounted in money value to only $21,000, showing by comparison the tremendous development that has taken place in that industry in thirty years, an increase of over sixty times. Louisiana now ranks third in crabmeat production. Today we have twelve up-to-date, sanitary crabmeat picking and packing plants, producing in excess of five million pounds of crabmeat annually. The demand for this choice food is constantly increasing. Since all of this product must be hand picked, the strictest sanitary requirements have been applied to such operations, in conformity with the recommendations of the Federal Food and Drug Administration, which Department controls the interstate inspection of such products. The products are usually packed in one or five pound containers and thoroughly iced and refrigerated for shipment. The meats are usually graded into three classes, the "lump" meat from the muscles of the back fins, the "white" or "flake" meat from the smaller muscles, and the "claw" meat. Since the claw meat has a slight brownish color it brings a lower price, altho many prefer it for its flavor. As in the shrimp industry, there is a large amount of waste or refuse, amounting on the average to about eighty or eighty-five per cent of the total weight of the cooked crabs. In other words, from one hundred pounds of cooked crabs the pickers will recover from fifteen to twenty pounds of crabmeat, depending upon the fullness and fatness of the crabs. While a considerable quantity of the crab backs are cleaned out, sterilized and supplied with shipments of crabmeat, to serve as shells for stuffing for baked crabs, there remains a tremendous amount of waste, that is, between twenty and twenty-five million pounds, which waste contains materials to be utilized for by-product manufacture. The shells or backs contain calcium carbonates and phosphates, and together with the other waste or refuse, contain proteins and fats, utilizable after drying and grinding, for animal feeds and fertilizers. Such dried waste material brings about $25 or $30 a ton, and feed or fertilizer dealers will buy all offered them. There is also a great possibility that this waste material may furnish other industries with crude materials for by-product manufacture. That fat of the crab is an exceedingly nutritive product and its recovery might greatly increase the revenues of this industry. Since the crabmeat industry has only assumed such large proportions in Louisiana in relatively recent years, there is every probability that future chemical investigations and research will develop products from the industry's refuse unthought of today.

As in the shrimp industry, Louisiana leads all the other states in oyster culture and production, having risen to this position in recent years, undoubtedly due to the superior quality and flavor of the Louisiana oyster. The increase in production of oysters has not been as great as in the case of shrimp and crabmeat production but the rise has been steady. By comparison, Louisiana produced 2,081,067 bushels of oysters in 1913 and in 1937 a total of 3,261,528 bushels, an increase for the twenty-five year period of over sixty per cent. Records of the State Conservation Department show that there are 477 thousand acres of water bottoms available for oyster culture, while there are only 20 to 25 thousand acres under actual cultivation, indicating an immense amount of room for expansion. Oyster cultivation has been conducted chiefly by persons of Slavic and French descent, some families having been engaged in such cultivation for at least forty or fifty years. At the present time, there are forty plants shucking or steaming and packing oysters in Louisiana under certification of the State Health Department. Those plants packing raw shucked oysters also have certification of the U. S. Public Health Service, such certification being a joint or cooperative supervision for protection of the raw oyster industry and the consumers of such products. Since all of Louisiana's oyster producing areas are so remotely situated from any communities or waste disposals, they are entirely protected against any probability of contamination. Besides being sold in the shell in sections closer to the bedding grounds, oysters are prepared for shipment by shucking raw in half gallon and gallon cans, or by steaming and packing in hermetically sealed cans. Those packed raw are placed in cans bearing the Louisiana Certificate Number, such number being an identification of their source. Recently, under revised regulations of the U. S. Public Health Service, oyster fishermen have been required to sack and tag all oysters at the bedding grounds as a means of identification as to source of production. Stringent sanitary regulations have been thrown around the production and packing of oysters for years to safeguard this important food product. As to the waste products of the oyster industry, the only product is the shells. While the law requires a certain amount of these shells to be returned to the bedding grounds, a large number are used for crushing for road paving purposes. Again, the shell furnishes an abundant supply of lime or calcium carbonate in relatively pure form which can be, and is being utilized at present by two new chemical industrial plants which have located in Louisiana in recent years, one at Lake Charles and one at Baton Rouge, where alkalis and Calcium Hypochlorites are presently being manufactured. The shells have also been used for button manufacture, for ash trays, and numerous other novelties. The oyster industry, generally, offers great prospects for future development.

A word about the nutritive value of these important seafoods will be in order. The Louisiana seafoods, especially the oysters and shrimp, are abundant in healthful minerals. They contain higher proportions of iodine, which makes them beneficial for thyroid deficiencies, one Louisiana oyster containing sufficient iodine for a daily dose. These seafoods also contain copper, iron, calcium, and phosphates, all necessary vital minerals. Additionally, the vitamins are present in good quantity, oysters especially containing the four important vitamins, A, B, D, and G. These are important medicinal or dietetic properties which could well serve for the future development of additional products from the Louisiana seafoods.

All in all, there appear prospects for a bright future for the seafood industries of Louisiana and the chemist can contribute a great deal toward that development.

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New England's trees in common with its people sustained an incalculable loss in the hurricane of September 21. In point of towns and people affected and in timber values involved, the blow-down was the worst in the history of the country.

■ **Oyster lugger passing through the locks at Harvey's Canal.**

The Paper and Pulp Industry in the South

By
Arden Watson Chapman

New trends and new developments, whether they be in thought, style, research, or industry, are worthy of discussion and comment. Sometimes these new ideas and plans burst on one with a fanfare of trumpets and a blast of publicity, while at other times the changes, though important, may take place so quietly that it is only by stopping and reviewing their history that we can be made to realize how rapid the advance has been. The fact that there are pulp and paper mills in the South may not be news to you, but do you know that, of the 27 pulp mills now operating in the Southern States, eleven have been built within the past three years? If this information is new to you, you are probably now asking yourself what **is** the paper and pulp industry, why is it moving into the South, what will be the effect of this industry on the economic welfare of the South, and, will it be a permanent addition to this section or will the mills migrate elsewhere? I hope these are the questions which have been passing through your mind, for these are the questions which will be dealt with briefly in this talk.

Now it is not my intention to make this a dry technical paper, but unfortunately, when talking about a technical industry or process it is necessary at times to use words which have a special meaning. Let us, therefore, briefly discuss a few terms which will be used later in this talk. First of all, the pulp and paper industry is, logically enough, the industry which manufactures pulp and paper, meaning that each mill either makes finished sheets of paper, or prepares the fiber for later manufacture into paper, storing it meanwhile as pulp. Paper is a man-made rearrangement of fibers grown by Mother Nature. A large number of different plants can be used to furnish fiber suitable for paper-making, but the greatest source of raw material, and the one in which we are interested, is wood, or the tree.

A tree growing in the woods certainly does not look much like a piece of writing paper or the wrapping in which the meat is delivered by your butcher, but nevertheless the growing tree is really the first manufacturing unit in paper-making. It is really a bundle of fibers cemented together by certain natural glues or juices. To break a log down into fiber either mechanical or chemical means are used. In the mechanical method, the wood is merely ground by huge grindstones, giving rise to a type of pulp known, naturally enough, as ground wood. Three methods of chemical treatment are used. In the soda process, the wood is cooked with caustic soda. In the sulphite process surphurous acid is used, while in the sulphate process, also known by the name kraft, a combination of caustic soda and sodium sulphate is employed. By whatever method the wood is reduced to fibers, the resulting mass is then made into pulp or into sheets of paper. If the natural color of the fiber is too dark for the type of paper which is to be made, it may be whitened by chemical bleaching. So much for the manufacturing methods, a detailed description of which would take up the entire time allotted, but enough has been said to define the technical terms. However, paper-making is an interesting process and, if you have never seen a paper mill in operation, I suggest that you visit one and view the marvelous machinery which is used to produce this modern necessity.

This article is reproduced from a radio broadcast by Mr. Chapman over Station WDSU, New Orleans, sponsored by the Department of Commerce and Industry. Mr. Chapman is chief chemist of the Celotex Corporation and gives us a graphic picture of the lusty young industry that is rapidly changing the South's economic picture.

The first paper mill built in the South was erected right here in Louisiana at Braithwaite in 1898 by an English syndicate attempting to make paper from bagasse. This experiment failed, but as an indication of the progress of science it it interesting to note that a huge mill, that of The Celotex Corporation, is now operating just across the river from New Orleans using this self-same bagasse, not to make paper, but to produce an insulating building board. The Braithwaite paper mill was leased to the E-Z Opener Company in 1915 and successfully operated as a kraft mill until 1931, when the plant was moved to Tuscaloosa.

The first attempt to make paper from Southern pine wood was undertaken at Pensacola about 1903. This operation did not prove entirely successful and the equipment was later moved to Orange, Texas. Here a change was made from the soda to the sulphate process which resulted in a successful commercial product, the first sulphate or kraft pulp made from yellow pine trees in the South.

The second mill to operate on southern pine was built at Moss Point, Miss., in 1913. In the experimental work carried on before this mill was erected southern wood was sent to Sweden where it was made into bleached and unbleached sulphate pulp. This pulp was later converted in England into wrapping paper and white book paper. As a result of this successful demonstration, English investors furnished a large part of the money required to finance the Moss Point mill.

Turning our attention back to Louisiana, we find that the first unit of the Brown Paper Mill Company's plant at Monroe started operation in 1924 with a capacity of 80 tons of finished stock per day. The daily capacity of this mill now is about 600 tons.

Over at Bogalusa, where a sawmill was cutting 20 million feet of lumber monthly, it was decided to stop burning the refuse and convert it into a useful commodity, such as paper. Today, the Bogalusa Paper Company is turning out pulp, paper, and paperboard at the rate of 250 tons per day.

In 1920 a sulphate pulp mill was built at Bastrop. 1928 saw one in construction at Camden, Arkansas, and the next year one was erected at Mobile, while last year a new $7,000,000 mill was started at Springhill, Louisiana.

In 1928 the first machine of the Southern Advance Bag & Paper Co. was installed at Hodge, Louisiana, and, after further installations, the present capacity here is 200 tons per day.

Over at Houston the Champion Fibre Company erected a huge bleached sulphate plant last year.

With the new plants that have been erected and the additions that have been made to the older ones, the southern branch of the paper industry will have this year a combined capacity of 1,700,-

■ **Proper method of pulpwood cutting, showing seed trees and saplings left after cutting.**

000 tons of sulphate pulp, enough to fill over 400 miles of boxcars. The effect of this new source of supply can be better realized when we consider that this quantity is equal to about 20% of the entire nation's demand, and that it will compete on the American market primarily against material supplied by foreign competition.

Why has this huge industry moved South? Well, first of all because of the abundance of the necessary raw material, wood, in this section. In the lower Southern States, that is, South Carolina, Georgia Florida, Alabama, Mississippi, Louisiana, Arkansas, and Oklahoma, there are over 130 million acres of forest lands. Of this about 87 million acres represent pine, the remainder hardwoods. Of Louisiana's 16 million acres of forest lands, 3 million are longleaf and slash pines, 5 million shortleaf, loblolly, and other pines, and the remainder mainly bottomland hardwood and cypress.

Of southern forest lands less than 20 million acres are original stands, but the recuperative powers of this section are remarkable as is indicated by 110 million acres of restocked land of which 51 million are in sawlog condition. This means that with protected lands and planned cutting these forest lands should produce forever. The paper men are determined to plant a tree for every one cut down in order to preserve the supply. Moderately good forest land in the South grows a cord of pine per acre per year, and a tract can be cut every 15 years or oftener. Or, after 15 years, the trees can be used for turpentine production for 6-8 years, and then be cut. Hence, as far as the replanting goes, the paper men have planned wisely unless their work is nullified by lack of forest-fire control. There are 200 million acres of southern private or state-owned lands of which only 36% are under some form of state-directed cooperative fire protection. This particular feature is the only threat to the permanence of the source of raw material for this great industry.

In addition to the South's forests, the other factors that have induced plant establishment in this territory are efficient labor, plentiful and good water, and an abundant supply of three fuels—coal, gas, and fuel oil. These features, of course, are attractive to many other industries, as well, and the movement of industry into the South is now under way.

So much has the South offered the paper industry. What is the industry giving in return? First of all, a large amount of money is being spent and has been spent on new sites and additions to old mills. Construction under way last year and this totals 60 million dollars. Another 40 million was spent for labor improvements, work villages, and land purchases. Once operating, the mill payroll puts money in circulation. Over at Savannah with only the first third of the new mill in production, the two million dollars of annual wages doubled the city's industrial payroll.

One striking sidelight of the increased demand of this industry for wood is that it offers a new crop to the farmer. Cordwood can be cut the year round during slack seasons on the farm and can be converted into cash, which will do much to relieve the situation in a region which has been so predominantly a one-crop district. Also, increased industrial payrolls mean more consumers of garden truck, milk, and eggs, with subsequent aid to the farmer.

As to the future of the pulp and paper industry in the South, we can be sure that the new mills will not migrate elsewhere with a permanent source of raw material available here, so that there is little possibility that the industry will become less important with the passing of the years. The area of southern pine forests is great and the trees grow much more rapidly than the pulpwood species in the northern part of the United States, Canada, or in the principal pulp-producing countries of Europe. The demands for southern pine for lumber in recent years have been much less than before the depression, and even with full recovery in the building industry they may not become as great as before, by reason of the tendency to substitute other materials for wood in construction. Consequently, with proper care the annual growth in the South could keep pace with a very large annual cut for pulp use.

But permanent sources of raw material are not the only reasons for the paper

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Oil and Gas Wells Completed in South Louisiana During 3rd Quarter of 1938

Field	Name of Company	Name of Well	Date Completed	Initial Daily Production	Size Choke (Inch)	Grav-ity	Total Depth (Feet)
BANCROFT (Beauregard Ph.)	Republic Prod. Co.	Columbia Land & Timber #1	8/30/38	630 Bbls.	1/4	42	7,382
BAYOU BLUE (Iberville Ph.)	Humble Oil & Refg. Co.	A. Wilberts & Sons L & S Co. #8	9/27/38	208 Bbls.	1/4	36	......
BAYOU CHOCTAW (West Baton Rouge Ph.)	Standard Oil Co. of La.	Morley Cypress Co. #1	9/26/38	569 Bbls.	1/4	40	8,270
BAYOU DES ALLEMANDS (St. Charles Ph.)	Amerada Pet. Corp.	Des Allemands #4	8/12/38	200 Bbls.	1/4	52	....
BIRD ISLAND (Plaquemines Ph.)	Gulf Refg. Co.	Grand Prairie Levee District A-#1	7/9/38	401 Bbls.	1/4	28	6,151
CHACAHOULA (Lafourche Ph.)	Sun Oil Co.	Dibert, Stock & Brown #2	9/5/38	840 Bbls.	1/4	32	7,253
CHARENTON (St. Mary Ph)	Pan American Prod. Co.	E. J. Robicbeaux #4	7/2/38	80 Bbls.	....	19	1,899
	Pan American Prod. Co.	Veeder #8	7/12/38	147 Bbls.	1/4	21	1,835
	Pan American Prod. Co.	Laws Realty Co. #10	8/3/38	10 Bbls.	11/64	19	2,759
	Parish Drilling Co.	Paul LeBlanc #1	8/3/38	110 Bbls.	1/4	19	1,146
	Pan American Prod. Co.	Laws Realty Co. #9	9/1/38	243 Bbls.	1/4	37	6,772
	Pan American Prod. Co.	A. Veeder Co. Inc. #9	9/12/38	82 Bbls.	....	22	1,830
CHENEYVILLE (Rapides Ph.)	Amerada Pet. Corp.	J. B. Weil #5	8/1/38	600 Bbls.	3/8	......	6,005
CREOLE (Cameron Ph.)	Superior Oil Co.	Gulf of Mexico State #2	7/25/38	477 Bbls.	14/64	35	5,160
DARROW (Ascension Ph.)	Humble Oil & Refg. Co.	Val E. Landry #3	7/11/38	730 Bbls.	1/4	38	6,969
EAST HACKBERRY (Cameron Ph.)	Union Sulphur Co.	Watkins #44	7/18/38	435 Bbls.	1/4	22	2,828
DOG LAKE (Terrebonne Ph.)	The Texas Co.	LLE-Dog Lake #6	7/17/38	787 Bbls.	1/4	38	6,837
EVANGELINE (Acadia Ph.)	B. Henington	Houssiere-Latrelle #1	7/28/38	250 Bbls.	1/4	26	1,758
	Superior Oil Co.	Wm. Leckelt #14	7/12/38	418 Bbls.	13/64	38	8,570
	Frank W. Bennett	Freeman & Garden #1	8/31/38	481 Bbls.	14/64	35	5,767
	W. S. Noble & R. S. Baker	Ed. Prather #1	8/31/38	372 Bbls.	14/64	39	7,456
	Glassel & Glassel	Edward Trushel #5	8/21/38	530 Bbls.	14/64	38	7,250
	Superior Oil Co.	Jules Clement #4	8/17/38	355 Bbls.	......	41	6,530
	Superior Oil Co.	Iowa Jennings #4	8/3/38	259 Bbls.	14/64	35	6,290
	Superior Oil Co.	Wm. Leckelt #13	8/10/38	612 Bbls.	14/64	41	7,612
	Guaranty Oil Corp.	Clement #1	9/30/38	165 Bbls.	12/64	27	3,467
	Shell Pet. Corp.	Conover Community #4	9/22/38	418 Bbls.	14/64	28	6,459
	Ladak Oil Co. Inc.	Jules Clements #6	9/13/38	15 Bbls.	....	24	1,010
GARDEN ISLAND BAY (Plaquemines Ph.)	The Texas Co.	Garden Island Bay #29	7/7/38	962 Bbls.	1/4	37	6,993
GIBSON (Terrebonne Ph.)	Shell Pet. Co.	Pelican #6	7/13/38	950 Bbls.	1/4	37	9,505
	Shell Pet. Co.	Pelican #7	8/15/38	988 Bbls.	1/4	37	9,502
HARANG (Lafourche Ph.)	Wm. Helis	Valentine #2	7/1/38	1,200 Bbls.	1/4	38	7,582
	Pan American Prod. Co.	Community B-2	8/29/38	675 Bbls.	1/4	32	9,325
	Pan American Prod. Co.	Harang #18	8/29/38	611 Bbls.	1/4	33	4,619
	Wm. Helis	Valentine #3	9/12/33	324 Bbls.	3/16	37	7,404
HESTER (St. James Ph.)	Continental Oil Co.	Realty Operators #1	7/30/38	175 Bbls.	1/4	44	7,499
IBERIA (Iberia Ph.)	Canal Oil Co. Inc.	Sabatier #4	7/7/38	239 Bbls.	1/4	23	2,315
	The Texas Co.	J. P. Duhe #7	7/3/38	925 Bbls.	5/16	32	5,917
	Wm. Helis	Bullock #7	7/9/38	811 Bbls.	1/4	32	5,980
	Harry Fotiades	Gulf Fee #5	8/18/38	241 Bbls.	1/4	23	4,958
	The Texas Co.	Porteus E. Burke #2	8/12/38	286 Bbls.	17/64	29	5,804
	The Texas Co.	Celeste Gralino #4	8/12/33	707 Bbls.	1/4	29	6,169
	Wm. Helis	J. E. Schwing #6	9/25/38	165 Bbls.	1/4	22	5,012
	The Texas Co.	J. P. Duke #8	9/27/38	498 Bbls.	1/4	31	5,940
	The Texas Co.	J. E. Schwing #2	8/28/38	418 Bbls.	1/4	21	5,029
LAFITTE (Jefferson Ph.)	The Texas Co.	LLECO-Lafitte #11	8/7/38	1,733 Bbls.	3/8	.....	10,093
	The Texas Co.	Madison Realty Co. #3	9/2/33	1,388 Bbls.	3/8	37	10,138
LAKE LONG (Lafourche Ph.)	Fobs Oil Co.	State-Lake Long #4	7/4/38	96 Bbls.	12/64	47	10,472
	Fohs Oil Co.	State-Lake Long #5	9/30/38	908 Bbls.	1/4	37	10,267
LEEVILLE (Lafourche Ph.)	The Texas Co.	LLECO-Leeville #69	7/24/38	385 Bbls.	1/4	35	6,537
LIRETTE (Terrebonne Ph.)	Fohs Oil Co.	Bay Baptiste #1	8/17/38	47 Bbls.	10/64	50	11,178
NORTH CROWLEY (Acadia Ph.)	Humble Oil & Refg. Co.	Federal Land Bank of No. #3	7/12/38	455 Bbls.	3/16	36	7,206
	Humble Oil & Refg. Co.	Anton Ohlenforst #3	8/5/38	470 Bbls.	13/64	36	7,201
	Humble Oil & Refg. Co.	H. J. Trevis #1	9/19/38	458 Bbls.	3/16	36	7,198
PORT BARRE (St. Landry Ph.)	T. G. Markley	Ovide Lahaye #1	7/21/38	200 Bbls.	1/4	34	4,785
	Pan American Prod. Co.	Ovide Lahaye #1	8/8/38	219 Bbls.	1/4	33	4,708
	Pan American Prod. Co.	H. L. Garland #3	9/16/38	662 Bbls.	1/4	39	5,448

Field	Name of Company	Name of Well	Date Completed	Initial Daily Production	Size Choke (Inch)	Grav-ity	Total Depth (Feet)
QUARANTINE BAY (Plaquemines Ph.)	Gulf Refg. Co.	Orleans Levee Dist. A-1	9/27/38	398 Bbls.	7/32	34	....
SORRENTO (Ascension Ph.)	Pan American Prod. Co.	United Lands Co. #14	9/17/38	74 Bbls.	1/4	23	1,315
VENICE (Plaquemines Ph.)	Tide Water Assoc. Oil Co.	Buras Levee Dist. #1	9/20/38	624 Bbls.	1/4	41	7,472
VILLE PLATTE (Evangeline Ph.)	Continental Oil Co.	E. Tate-R. M. McDaniel #1	7/20/38	569 Bbls.	3/16	40	9,004
	Continental Oil Co.	Opelousas-St. Landry-Derouen #1	7/25/38	574 Bbls.	3/16	39	9,131
	Continental Oil Co.	Oscar Pitre #1	7/7/38	450 Bbls.	3/16	39	9,055
	Continental Oil Co.	Pierre-McDaniel #2	8/30/38	665 Bbls.	1/4	41	8,997
	Continental Oil Co.	A. M. Fontenot #1	8/4/38	497 Bbls.	3/16	41	9,049
	Amerada Pet. Corp.	A. F. Fournier #2	8/12/38	887 Bbls.	5/16	41	9,103
	Continental Oil Co.	Opl. StLd. Sec Co. #2	9/11/38	612 Bbls.	1/4	39	9,103
	Continental Oil Co.	A. Coreli #1	9/12/38	871 Bbls.	3/16	38	9,112
	Continental Oil Co.	La. Cent L&l #2	9/19/38	799 Bbls.	1/4	41	9,090
WEST DULAC (Terrebonne Pb.)	Fohs Oil Co.	Buckley-Bourg #1	7/17/38	100 Bbls.	12/64	48	13,333
WEST GUEYDAN (Vermilion Ph.)	Magnolia Pet. Corp.	J. B. Ferguson #1	7/1/33	53 Bbls.	1/4	57	7,150
WEST HACKBERRY (Cameron Ph.)	Superior Oil Co.	Vincent #2	7/3/38	874 Bbls.	1/4	41	6,525
	Superior Oil Co.	Benson Vincent #3	8/24/38	648 Bbls.	16/64	38	6,632
	Stanolind Oil & Gas Co.	Dorisse Kaough #1	8/17/38	317 Bbls.	......	23	3,060
WHITE CASTLE (Iberville Ph.)	Shell Pet. Corp.	A. Wilbert's Sons #12	7/15/38	561 Bbls.	17/64	28	6,403
WOODLAWN (Jeff. Davis Ph.)	Union Sulphur Co.	O. Miller #1	9/14/38	359 Bbls.	3/16	35	8,918

Oil and Gas Wells Completed in North Louisiana During 3rd Quarter of 1938

Field	Name of Company	Name of Well	Date Completed	Initial Daily Production	Size Choke (Inch)	Grav-ity	Total Depth (Feet)
COTTON VALLEY (Webster Ph.)	Ohio Oil Co.	Bodcau Lbr. Co. A/4 #4	7/22/38	1,215 Bbls.	3/8	75	5,830
	Union Prod. Co.	H. I. Josey #1	7/22/38	477 Bbls.	3/8	71	8,145
	Hunt Oil Co.	Davis #1	7/17/38	47 Bbls.	3/8	75	5,969
	Hunt Oil Co.	Bodcau Stewart #2	7/19/38	452 Bbls.	3/8	75	5,945
	Magnolia Pet. Co.	Robbins Unit #1	7/19/38	445 Bbls.	3/8	71	8,485
	Hunt Oil Co.	Bodcau Lbr. Co. #1	7/12/38	201 Bbls.	3/8	50	5,953
	Magnolia Pet. Co.	Crichton Heirs Unit #1	7/30/38	644 Bbls.	1/2	61	8,414
	Ohio Oil Co.	Tillman Gledson #1	7/23/38	432 Bbls.	3/8	71	8,366
	Hunt Oil Co.	Webb #4	7/13/38	778 Bbls.	3/8	50	5,942
	Fohs Oil Co.	Thomas Cricbton, Jr., #1	7/2/38	472 Bbls.	30/64	71	8,598
	Mid States Oil Co.	Welori Lbr. Co. #1	7/8/38	1,166 Bbls.	1/4	44	8,687
	Obio Oil Co.	A. H. Gray a/c3 #1	7/4/38	324 Bbls. & 5 MCF	3/8	......	8,103
	A. G. Olipbant	Hodges #2	7/2/38	256 Bbls. & 3 MCF	1/4	71	8,205
	Hunt Oil Co.	Bodcaw #2	8/23/38	360 Bbls.	1/4	......	5,960
	Ohio Oil Co.	R. R. Cox a/2 #4	8/21/38	387 Bbls. & 5 MCF	3/8	......	8,602
	Hunt Oil Co.	Babb #8	9/15/38	201 Bbls.	1/2	71	9,002
	Hunt Oil Co.	Hope #21	9/7/38	1,032 Bbls.	3/8	71	5,871
	Northb American Oil Consld.	Burrow #1	9/6/38	744 Bbls.	1/2	44	8,680
GEORGETOWN (Grant Ph.)	Rogers Prod. Corp.	J. L. Holmes #3	8/18/38	125 Bbls.	....	......	1,597
LISBON (Claiborne Ph.)	Sloan & Zook Co.	T. F. Patton #2	7/2/38	384 Bbls.	1/2	34	5,351
	Lyons & Neely	L. L. Lowery #1	7/3/38	336 Bbls.	22/64	......	5,309
	Magnolia Pet. Co.	D. E. Fowler #2	7/5/38	25 Bbls.	....	34	5,214
	Gulf Refg. Co.	C. S. L. Patton #1	7/8/38	1,408 Bbls.	32/64	35	5,311
	Sklar Oil Corp.	T. M. Kilgore #4	7/11/38	98 Bbls.	3/4	34	5,332
	Prairie Oil & Gas Co.	Sally Lloyd #1	7/14/38	1,248 Bbls.	36/64	34	5,318
	A. O. Olsen	Effie Kennedy #1	7/15/38	528 Bbls.	3/4	34	5,205
	Sklar Oil Corp.	T. M. Kilgore #3	7/19/38	336 Bbls.	3/4	34	5,290
	Sloan & Zook Co.	H. W. Patton #8	7/23/38	453 Bbls.	25/64	34	5,391
	Harry Fotiades	C. S. Rogers #1	7/26/38	1,248 Bbls.	3/4	34	5,406
	Love Petroleum Co.	S. M. English #2	7/31/38	792 Bbls.	15/64	34	5,108
	Harry Fotiades	C. C. Whitman #2	8/1/38	1,440 Bbls.	18/64	34	5,261
	Gulf Refg. Co.	C. S. L. Patton #2	8/2/38	1,800 Bbls.	16/64	34	5,392
	Sells Pet. Co.	C. S. L. Patton B-1	8/7/38	600 Bbls.	3/4	34	5,327
	C. H. Lyons	T. M. Kilgore #1	8/9/38	360 Bbls.	1/4	36	5,429
	Prairie Oil & Gas Co.	Sally Lloyd #2	8/9/38	1,632 Bbls.	3/4	34	5,356
	Texas Canadian Oil Corp.	L. L. Lowery B-1	8/16/38	1,440 Bbls.	1	34	5,296
	Texas Canadian Oil Corp.	H. W. Patton #1	8/20/38	1,122 Bbls.	3/4	34	5,282
	Rodessa Oil & Refg. Co.	T. H. Lloyd #1	8/23/38	240 Bbls.	3/4	......	5,362
	Harry Fotiades	C. S. Rogers #2	9/3/38	264 Bbls.	16/64	34	5,339
	Magnolia Pet. Corp.	Sallie Lloyd #4	9/9/38	840 Bbls.	1/4	33	5,400
(Lincoln Ph.)	Harry Fotiades	T. F. Patton #1	7/10/38	363 Bbls.	32/64	34	5,390
	Magnolia Pet. Corp.	Patton Heirs #3	7/25/38	1,536 Bbls.	3/4	34	5,329
	Magnolia Pet. Corp.	S. L. Fuller #1	8/1/38	150 Bbls.	....	30	5,371
MONROE (Ouachita, Union & Morehouse Phs.)	Union Prod. Co.	D'Arbonne A-5	7/10/38	1½ MCF	....	......	2,200
	Union Prod. Co.	Grayling #7	7/6/38	11 MCF	....	......	2,145
	Inabnet & Pipes Co.	Peck #1	7/12/38	4½ MCF	....	......	2,154
	Interstate Nat'l Gas Co.	W. A. Edwards Inc. #83	7/21/38	1 MCF	....	......	2,180
	Inabnet & Pipes	Peak #2	8/8/38	3 MCF	....	......	2,144
	Union Prod. Co.	Fee (103) #1	8/10/38	9 MCF	....	......	2,165
	Inabnet & Pipes	Peak #3	8/17/38	2 MCF	....	......	2,207
	Interstate Nat'l Gas Co.	Fee #82	8/19/38	2 MCF	....	......	2,159
	Union Prod. Co.	Fee 115 #1	8/22/38	5½ MCF	....	......	2,166

Field	Name of Company	Name of Well	Date Completed	Initial Daily Production	Size Choke (Inch)	Gravity	Total Depth (Feet)
MONROE (Ouachita, Union & Morehouse Phs.) (Continued)	Interstate Natural Gas Co.	Mineral Fee #87	8/29/38	8 MCF	....	......	2,177
	Interstate Natural Gas Co.	Mineral Fee #86	8/29/38	5½ MCF	....	......	2,153
	Inabnet & Pipes Co.	Peak #4	9/3/38	4 MCF	....	......	2,200
	Union Prod. Co.	Fee 105 #3	9/9/38	12 MCF	....	......	2,140
	Southern Carbon Co.	Grayling #26	9/10/38	4 MCF	....	......	2,200
	Southern Carbon Co.	Grayling #27	9/26/38	2½ MCF	....	......	2,189
	Southern Carbon Co.	Grayling #28	9/26/38	3 MCF	....	......	2,200
	Union Prod. Co.	Fee 105 #4	9/27/38	6 MCF	....	......	2,175
	Union Prod. Co.	Crossett #58	8/3/38	10 MCF	....	......	2,254
	Union Prod. Co.	Tensas Delta #31	8/10/38	3½ MCF	....	......	2,190
	Southern Carbon Co.	Tensas Delta #22	8/10/38	3½ MCF	....	......	2,190
	Union Prod. Co.	Crossett #59	8/22/38	8½ MCF	....	......	2,234
	Union Prod. Co.	Ten Delta #32	8/22/38	? MCF	....	......	2,180
	Interstate Natural Gas Co.	Fee #85	8/29/38	9 MCF	....	......	2,164
	Union Prod. Co.	Morehouse Sch Bd #2	9/9/38	8½ MCF	....	......	2,175
	Union Prod. Co.	Ten Delta #33	9/9/38	2½ MCF	....	......	2,189
	Union Prod. Co.	Fee 71 #4	9/15/38	8 MCF	....	......	2,170
	Interstate Natural Gas Co.	Fee #84	9/24/38	4½ MCF	....	......	2,150
	Union Prod. Co.	Tensas Delta #34	9/27/38	3 MCF	....	......	2,191
	Union Prod. Co.	Fee 71 #3	9/27/ 8	3½ MCF	....	......	......
RODESSA (Caddo Ph.)	F. W. Buford	H. C. Brown #2	9/25/38	332 Bbls.	1	45	6,086
SHREVEPORT (Caddo Ph.)	R. E. Allison	Ellerbe #1	7/15/38	502 Bbls.	1/2	43	5,943
SLIGO (Bossier Ph.)	Union Prod. Co.	Skannal Unit C-3	7/6/38	30 Bbls.	1/2		3,120
	Triangle Drilling Co. & Ark Fuel Oil Co.	R. O. Roy A-1	9/8/38	300 Bbls.	3/8		3,121
ZWOLLE (Sabine Ph.)	Major Oil Co.	Bowman-Hicks Lbr. Co. #2	7/2/38	132 Bbls.	......	40	2,165
	Whitehurst Drilling Co.	Bowman-Hicks Lbr. Co. #1	7/2/38	10 Bbls.	2	38	2,410
	Major Oil Co.	Bowman-Hicks #3	7/30/38	182 Bbls.	......	39	2,217
	Lee W. Whitehurst	First Natl Bank #1	8/20/38	504 Bbls.	......	42	2,579
	Major Oil Co.	Sabine Lbr. Co. #1	8/6/38	64 Bbls.	......	40	2,592
	The Hunter Co.	Bowman-Hicks #6	8/26/38	368 Bbls	1/4	41	2,414
	H. L. Nutting	La. Long Leaf Lbr. Co. #1	9/17/38	68 Bbls.		44	2,830
	W. L. Posey	J. W. Hale #2	9/20/38	74 Bbls.	2½	41	2,577

The Paper and Pulp Industry in the South

[Continued from Page 49.]

and pulp industry remaining in the South. New products and possibilities open wide vistas ahead. Recognizing the possibilities of recovery from the waste of pulp mills, constant research is being directed toward increased utilization. With the phenomenal advance of plastics and other chemical discoveries, the time is probably not far away when present mill waste will be converted into fabricated construction materials stronger than wood itself. Liquid wastes that caused complaints of stream pollution may soon be turned to use for surfacing of secondary roads and become a source of industrial alcohol.

But there is even bigger game closer to hand. Present indications are that the South may break into the newsprint pulp field, and this is a field decidedly worth getting into, for two million tons are imported annually. Newsprint must be white and cheap. Eighty per cent of the fiber has no chemical treatment, being merely ground mechanically which demands a naturally white wood, requisite which spruce meets perfectly. But it has developed that young pine also has white wood and present indications are that a new era is on its way with the use of young slash pine for newsprint pulp. Editions of the Lewiston, Maine, DAILY SUN for last June 26th were printed on paper made experimentally by the Great Northern Paper Company from southern slash pine pulp. This paper proved entirely satisfactory and the slight creamy tint was barely noticeable.

Capital has now been pledged to erect a $6,250,000 newsprint mill in Texas and southern newspapers have contracted to take its output. The claim is made that newsprint pulp can be made $20 a ton cheaper in the South than in Canada, but this statement lacks commercial proof as yet.

A more recent development is the announcement of the manufacture of newsprint from black gumwood, this announcement coming from Dr. Charles Herty, research chemist, who developed the slash pine process. Here is another possibility which, if realized, will add millions to the annual valuation of products manufactured in the South.

All indications are that the pulp and paper industry in the South, large as it has already become, is destined for further growth.

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SPARROW HAWKS MISNAMED

Sparrow hawks are inaccurately named. They are more fond of grasshoppers than of sparrows. Indeed it is rather unusual for them to capture birds, though they often prey upon field mice. When the little hawks are seen hovering above the fields, usually they are in quest of insects or field mice. Sparrow hawks are of distinct benefit to the farmer, by their services in destroying rodents and insects. To shoot a sparrow hawk is to destroy a valuable assistant to agriculture.

At Gran Quivera National Monument, New Mexico, a pair of these birds is learning to be tolerant of tourists. Last spring they nested in the old mission where they were constantly disturbed. Notwithstanding their annoying experiences with inquisitive humans, the birds have returned this year and are raising a family under the same goldfish-bowl conditions.

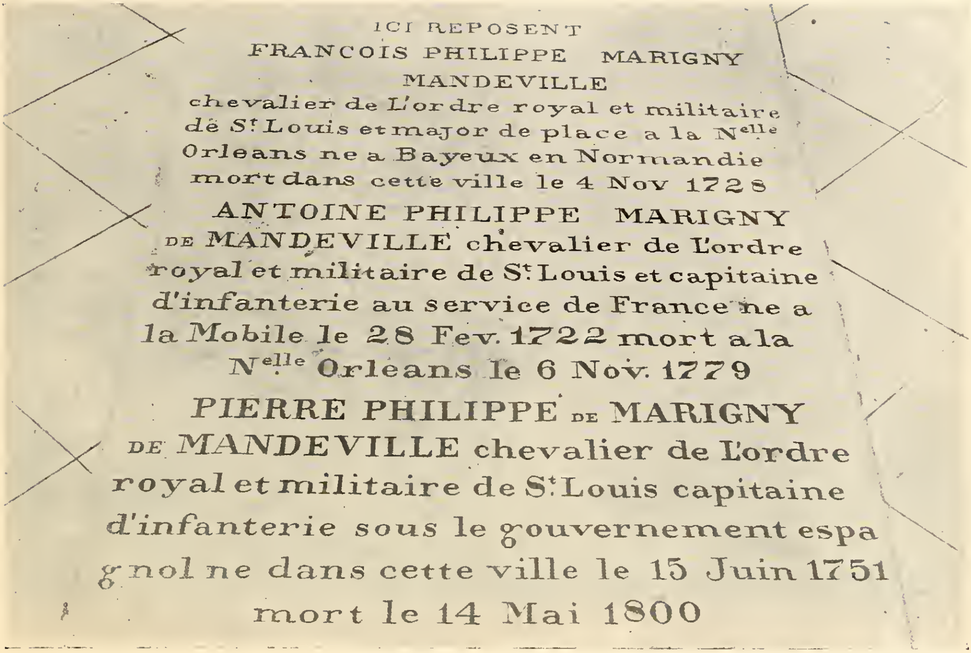
◆

JOHN MUIR'S BIRTHPLACE NOW FAMOUS FOR ITS TULIPS

John Muir, pioneer conservationist and "Father of the national parks and national forests," whose centennial is being celebrated during the current year throughout the United States, would perhaps experience some of the sensations of Rip Van Winkle, upon awakening from his long sleep, were he to revisit his birthplace, Dunbar, Scotland, today.

This section was once an outstanding potato country, but when potato-growing became less profitable some of the local farmers began to cultivate tulips. Tulip bulbs, they were told, would thrive on "potato land." The new type of crops flourished and the tulip-raisers prospered.

Today, therefore, John Muir's beauty-loving soul would thrill to the sight of the fields in the vicinity of Dunbar, with their gaily-colored tulips swaying and bending in the breezes of the lovely Scottish spring.



ICI REPOSENT
FRANCOIS PHILIPPE MARIGNY
MANDEVILLE
chevalier de L'ordre royal et militaire
de S^{t} Louis et major de place a la N^{elle}
Orleans ne a Bayeux en Normandie
mort dans cette ville le 4 Nov 1728
ANTOINE PHILIPPE MARIGNY
DE MANDEVILLE chevalier de L'ordre
royal et militaire de S^{t} Louis et capitaine
d'infanterie au service de France ne a
la Mobile le 28 Fev. 1722 mort a la
N^{elle} Orleans le 6 Nov. 1779
PIERRE PHILIPPE DE MARIGNY
DE MANDEVILLE chevalier de L'ordre
royal et militaire de S^{t} Louis capitaine
d'infanterie sous le gouvernement espa
gnol ne dans cette ville le 15 Juin 1751
mort le 14 Mai 1800

■ **Inscription on Tombstone of Marigny Family, St. Louis Cathedral, New Orleans.**

The Family of Marigny de Mandeville and The Fontainebleau Plantation 1700-1938[1]

A BRIEF CHRONOLOGY OF THE TCHEFUNCTE PARK AREA

By
N. E. Simoneaux
Secretary
State Parks Commission

PART I

Judging from numerous short newspaper articles, letters and personal requests for information, there is considerable wide-spread interest in the development of Tchefuncte State Park near Mandeville. For the benefit of those who like to be informed concerning the history of our State and the development and conservation of its recreational and cultural resources, there is given below a chronology of the principal events connected with the family of Marigny and Fontainebleau Plantation (formerly owned by Bernard Marigny and now included in the park area).

There has been so much misinformation concerning both that, at the risk of making this account cumbersome, the source of each statement will be found in a footnote so that it can be checked by those who would seek more information than can be given in the space available. This chronology makes no pretense of being complete—further research will be required to bridge the gaps, but the most important events are here given.

At the conclusion of this account, which will probably appear in two or more installments, there will be a resume of the work accomplished to date and of the development contemplated at Tchefuncte State Park.

1700. Francois Philippe de Mandeville, Sieur de Marigny, a native of Bayeaux, in Normandy, in France, came to the Colony of Louisiana (Fort Maurepas, at Biloxi, which

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[1] The writer wishes to acknowledge the assistance of the following in the preparation of this article: Clarence L. Johnson, Senior Foreman Historian, National Park Service, Tchefuncte State Park, and the officials of The Howard Memorial Library, The New Orleans Public Library, The Louisiana State Museum Library and the Cabildo.

■ **Scene Along Old Plantation Road, Tchefuncte State Park.**

was begun in February, 1699). Little is known of his antecedents.[2]

1706. Sieur de Marigny was commissioned as an ensign in the Company of Vaulezard (at Fort Louis de la Mobile below the present City of Mobile) replacing his brother the Sieur de Lambert who had died.[3]

1708. The Sieur de Marigny left Louisiana to return to France. In a memoir dated April 29, 1709 (place not given, but evidently written in France after his arrival) he describes his voyage, the condition of the colony and says:[4]

> And with the intention of informing the Minister Ponchartrain of everything that he desires to know about that country, of the quality of the country, about what can be done there and about what can be derived from it, knowing it thoroughly and having been there for eight years, having traversed all the lands and rivers that flow to the sea, knowing and understanding the majority of the nations that occupy it because of the long period that he has been with them, he departed from Havana on the fourteenth of last January in the Corvette Biche . . . . .

1709. Pontchartrain in a letter to Bienville dated July 11, mentions having talked with the Sieur de Marigny when the latter was in France.[5]

1710. In a letter from Pontchartrain to Bienville dated May 10th the former writes:[6]

> I was greatly surprised to learn that you have appointed Sieur Blondel to fill the lieutenancy made vacant by the absence of Sieur de La Durantaye and that you have given the post of ensign of the former to Sieur Darroc. His majesty has not at all approved of what you have done in that and his intention is not that you should think yourself authorized to make appointments to the posts. He has given the lieutenancy of the said Sieur de La Durantaye to Sieur de Mandeville de St. Lambert [The Sieur de St. Lambert was dead and the Sieur de Mandeville de Marigny is the appointee as shown below] . . . . .

1711. Bienville in a letter from Port Dauphin to Pontchartrain, of Oct. 27, says that the Sieur de Mandeville "has just arrived from France to whom your Lordship has given the lieutenancy of Chateaugue's company . . . . . I venture to tell you my lord, that he told me himself that he had deceived your Lordship, by passing himself off as his deceased brother".[7] . . . .

A Plan **de la Ville et Fort Louis de Louisane par les Francois en 1711, Levez & Designez par le Sr. Cheuillot** shows the square occupied by M. de Mandeville. Hamilton says[8] "about our Madison street in the present City of Mobile between Royal and St. Emanuel was (a) M. de Mandeville and next east of him, facing on Royal, was (T) the "**logement des prestres. . . . .**"

1713. Governor Cadillac wrote Ponchartrain on October 26, 1713 that he was sending the Sieur de Chateaugue "to command at Dauphin Island to relieve Sieur de Mande-

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[2] Rowland, Dunbar and Sanders, Albert Godfrey, *Mississippi Provincial Archives, 1701-1729, French Dominion, 2*, 29, Footnote 2. See also 46-52. The name is written as shown above but in most of the correspondence he is referred to simply as Mandeville and sometimes as Marigny de Mandeville. To avoid confusion, all members of the family will be referred to as Marigny, except when the name is mentioned in a quotation. This is done because the later members of the family dropped Mandeville from the family name.

[3] *Ibid.*, 29.

[4] *Ibid.*, 46-52. Especially 47.

[5] Rowland and Sanders, *Mississippi Provincial Archives, 1704-1743, French Dominion, 3*, 129.

[6] *Ibid.*, 141-142.

[7] *Ibid.*, 166.

[8] Hamilton, Peter J. *Colonial Mobile, an Historical Study*, 89. The map mentioned was unknown until 1895 and is reproduced on a two page spread between pages 86 and 87.

■ **Beach Scene on Lake Pontchartrain in Natural Condition, Tchefuncte State Park.**

ville who has been there and who had been asking me for this for a very long time. . . . ."[9]

1716. In 1716 the Sieur de Marigny is mentioned by Cadillac as being one of the captains satisfactory to him and as not being included in the clique headed by Bienville which opposed the Governor.[10]

The Sieur de Marigny and his company was ordered to Dauphin Island and "to make themselves huts in rows of four, for the work on which they will be paid, to make the camp compact and to enclose it in pickets. . . . ."[11]

1717. De Marigny's company stationed at Mobile, was sent to the newly built Fort Toulouse near the confluence of the Coosa and Tallapoosa rivers (in the present State of Alabama).[12]

1721. On June 4, the **Portefaix** arrived at Mobile bringing the Sieur de Mandeville who had recently visited France. He returned with a commission as Commandant of Fort Conde and had also been made a Chevalier de St. Louis.[13]

1722. Antoine Philippe de Marigny de Mandeville, son of Francois Philippe Marigny de Mandeville and Madeline Le Maire, born at Fort Conde, at Mobile.[14]

1724. De La Chaise in a letter to The Directors of the Company of the Indies written from New Orleans on September 6 says:[15]

> You will also find, Gentlemen, a large memorandum of the complaints of Sieur de Mandeville against Messrs. De Bienville and Chateaugue. He is an old officer of the colony who is not promoted. He sees all his cadets promoted over his head while he has been commissioned for twenty-two years. He seems to me to be an honest man. He has a wife and children. He hopes, Gentlemen, that since Mr. De Richebourg who was his senior is not returning to the colony, you will kindly grant him the post of Commandant of New Orleans in his place. Without murmuring he has seen you grant the position of Commandant of Biloxi to Sieur de Louboey, a man who has been in the country only two years.

The minutes of the Superior Council of Louisiana, New Orleans, May 2, 1724 say that the home of M. de Mandeville is of so little value "that at most only the planks could be got from it." Also it is "not worth much, however, it would be well to demolish them [it and other similar ones] since they are too close to the fort, but we can wait until there are other quarters to afford lodging for these gentlemen."[16]

A letter from Fort Conde at Mobile from Mr. Devin to Mr. De Pauger on August 29, 1724 says[17]

> Living at Mobile is beginning to be more disagreeable than ever. There is, so to speak, no more society. Madame de Mandeville who constituted its ornament is going to reside at New Orleans and is departing with Mr. de Mandeville, who has been so kind as to take charge of this letter, by the Pierre D'Aumale's launch.
>
> The Council of War assembled this day the second of December one thousand seven hundred and twenty-four in the residence of Mr. de Bienville, the Commandant General of this province, composed of Mr. de Bienville, Mr. de Chateaugue, the King's Lieutenant, Mr. de Mandeville, the first captain of the troops, of Mr. de La Chaise, the Commissary, and Messrs. Fazende and Perry, members of the Administrative Council. . . . .

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[9] Rowland and Sanders, *Op. cit.*, *2*, 195.

[10] Rowland and Sanders, *Op. cit.*, *2*, 210 and *3*, 201.

[11] *Ibid.*, *2*, 214-215.

[12] *Ibid.*, *2*, 234-235. Hamilton, *Op. cit.*, 96. Picket, Albert James, History of Alabama (Ed. of 1851.) 196. Crane, Verner W., *The Southern Frontier, 1670-1732*, 256 and footnote No. 7, Crane explained the different dates given for the construction of Fort Toulouse.

[13] Hamilton *Op. cit.*, 103. Rowland and Sanders, *Op. cit.*, *2*, 29, footnote 2. Martin, Francois Xavier, *The History of Louisiana*, 142.

[14] Family Tomb in St. Louis Cathedral at New Orleans, Louisiana.

[15] Rowland and Sanders, *Op. cit.*, *2*, 341.

[16] *Ibid.*, *3*, 415.

[17] *Ibid.*, *2*, 395.

■ **Ruins of Small Brick Structure, Possibly Smokehouse, on the Former Fontainebleau Plantation, Tchefuncte State Park.**

> Signed, Bienville, Chateaugue, de La Chaise, Fazende, Perry and Mandeville.[18]

M. de Mandeville had risen remarkably in rank from ensign to a place in the Council of war of Louisiana, and **Major de Place** of New Orleans.

1725. Private Letter of Mr. De La Chaise and of the Four Councillors, of June 8.[19]

> Mr. De Bienville having brought back the discord that had ceased during his absence, the officers have in concert with him composed a petition to send to Mr. Le Duc containing a flattering of those who compose the Council. The authors of this document are Sieurs de Blanc, Coustilhas and Thierry who have led the others astray. It is a defamatory libel. Mr. De La Chaise is called a tyrant and the Councillors pillagers and all the employees are treated infamously in it.
>
> They are convinced that those who compose the Council today are responsible for the fact that they are no longer free to take—as in the past—what they wish from the warehouses. Mr. De La Chaise and the Councillors have difficulty in conceiving that Mr. De Boisbriant should have signed such a slander. Several officers refused to sign it; such are Sieurs de Mandeville, Desliettes, Gauvrit, Dupuis and St. Esteben, who are all good officers but who have been so unfortunate as to displease Mr. De Bienville.

1728. Perier and De La Chaise to the Directors of the Company of the Indies at New Orleans, November 3, 1728.[20]

> As for Sieur de Louboey, he has been performing his duty and also the functions of major since the death of Sieur de Mandeville whom we lost several days ago.

1729. The widow of the Sieur de Marigny "remarried Francois Ignace Broutin, **Captain Ingeneur du Roi en cette colonie et Commandant des Natchez.**" Two of the daughters from this union married Jean Delfau de Pontalba and Louis Xavier de Lino de Chalmette.[21]

1748. Antoine Philippe de Marigny de Mandeville married Francoise de Lisle[22]

1751. Pierre Philippe de Marigny de Mandeville, son of Antoine Philippe de Marigny and Francois de Lisle, born at New Orleans, June 15.[23]

1759.

> In 1759, M. **de Marigni de Mandeville***, an officer of distinction, formed the design, with the consent of the governor of **Louisiana,** of making new discoveries towards the isle of **Barataria,** of which we know the coasts but very imperfectly: with this intent he made a general map of the colony. This officer has discovered this unknown country at his own expence, with indefatigable zeal, which characterizes a worthy citizen, who is always occupied for the glory of his prince, and the enlargement of his possessions.[24]

1773. Pierre Philippe de Marigny de Mandeville married Jeanne Marie d'Estrehan de Tour.[25]

1777. A tract of land composed of 774 superficial arpents was granted on Jan. 20 to Lewis Davis by Gov.

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* See the Memoirs of this officer, printed at Paris, by **Guillaume Despres,** in the rue **S. Jacques** 1765.

[18] *Ibid.*, *3*, 459.

[19] *Ibid.*, *2*, 468.

[20] *Ibid.*, *2*, 597. The Family Tomb in St. Louis Cathedral, New Orleans, La. gives Nov. 4, 1728 as the date of his death, and that he was *Major de Place* of New Orleans and a *Chevalier de L'ordre royal et militaire de St. Louis.*

[21] Cruzat, J. W. "Biographical and Genealogical Notes Concerning the Family of Philippe De Mandeville Ecuyer Sieur De Marigny 1709-1910", *Publications of The Louisiana Historical Society*, 5 (1911) (42-53).

[22] King, Grace *Creole Families of New Orleans*, 14.

[23] Inscription of Family Tomb, in St. Louis Cathedral, New Orleans, La.

[24] Bossu. M. *Travels through that part of America formerly called Louisiana*, English translation, London, 1771, 346.

[25] Arthur Stanley Clisby and de Kernion, George Campbell Hutchet, *Old Families of New Orleans*, 317.

■ **Young Pine Growing Under Old Live Oaks, Tchefuncte State Park.**

Peter Chester of West Florida, at Pensacola. This land situated on the North shore of Lake Pontchartrain was later part of Fontainebleau Plantation owned by the Marigny family.[26]

1785. Birth of Bernard Xavier de Marigny de Mandeville. His godparents were Xavier Delfau de Pontalba and Félicité Comtesse de Galvez.[27]

1798. Pierre Philippe de Marigny de Mandeville entertained the Duc d'Orleans, the Count de Beaujolais and the Duc de Monpensier at his home in New Orleans. This home was located on the river between present Elysian Fields and Marigny streets.[28]

1799. Tract of 4020 superficial arpents on the north shore of Lake Ponchartrain surveyed by Charles Laveau Trudeau, Surveyor General for the Province of Louisiana on Jan. 15. This tract was on Jan. 25, 1799 granted to Antonio Bonabel by Gov. Manuel Gayoso de Lemos.[29]

1800. Pierre Philippe de Marigny de Mandeville died at New Orleans, May 14, The inscription on the family tomb in St. Louis Cathedral states that he was a "Chevalier de L'ordre royal et militaire de St. Louis capitaine d' infanterie sous le government espagnol. . . . ."

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[26] *The Courrier of Louisiana*, April 2, 1832, p. 2, col. 1.

[27] King, *Op. cit.*, 21.

[28] *The Times Democrat*, Nov. 15, 1885, p. 3, col. 3. "Disappearance of an Old Memorial", locates the home of Pierre Philippe de Mandeville, but gives the date as 1799. Fortier, Alcée, *A History of Louisiona*, 2, 171-172, says 1798, but also says that Bernard De Marigny entertained them, which is an error.

[29] Original survey and Grant in State Land office, Baton Rouge, La. copy on file at State Parks Commission office.

[To Be Continued.]

* * *

The Mysterious Tarpon

[Continued from Page 9.]

purely fresh water. In the New Orleans area they move into Lake Pontchartrain at a time when the salinity is extremely low. Babcock noted instances in Florida where a barrow pit, whose content was so diluted by rain that it was almost fresh to the taste, was filled with tarpon which seemed to be able to tolerate existance in what was practically a mud hole. Babcock also records the fact that tarpon have been known to enter and ascend rivers for distances as much as a hundred miles.

Nichols, who has examined all the available data, has come to the conclusion that tarpon move toward the coast when they are about to spawn, although the eggs are actually deposited rather offshore. After egg laying, the adults appear to migrate coastward and enter the mouths of rivers. He believes that the young when hatched drift shoreward then move offshore again, returning to the coast when they are fairly good-sized. After that, they again move off-shore where they attain their full growth.

Babcock was inspired by a publication of the Department of Conservation, "Fishes and Fishing in Louisiana," to investigate the possibility that tarpon breathe air. In that book, of which the present writer was author, there was given an account of the air-breathing abilities of gar and bowfin (choupique). Intrigued by the fact that the tarpon also characteristically rises to the surface and "rolls," Babcock initiated an investigation of the structure of the tarpon's air bladder. Hildebrandt conducted subsequent researches revealing that the interior of the air bladder of the tarpon contains two longitudinal bands of cellular or lung-like tissues, one larger than the other and re-divided posteriorially. "Two 'lungs' as in higher vertebrates are suggested." This discovery clearly explains the remarkable ability of tarpon to tolerate conditions of stagnant water. Cable provides interesting and instructive illustrations of these structures.

LEAPING ABILITY OF THE TARPON

The ability of the tarpon to leap provides the most spectacular characteristic of this magnificent fish. Observers who appear to be reasonably clearminded have estimated vertical leaps of 12, 15 and even 18 feet and horizontal leaps of 30 feet. Babcock, an absolutely reliable observer, has noted horizontal leaps of 22 feet. The leaping of the tarpon adds immeasurable thrill for the fisherman. Tarpon will leap 10 or 12 times, shaking themselves violently while in the air in an endeavor to dislodge the hook. Tarpon have been known to jump into boats and have been even known to cause death through such accidents. A Negro guide was knocked from a boat at the mouth of the Brazos, stunned and drowned. A fisherman in a skiff at Avery Island, Louisiana, was struck by a leaping tarpon and killed by the blow. Babcock, at Boca Grande, vividly describes what certainly must be something of a record when on two successive nights tarpon jumped into his boat. "A boat close by struck a tarpon which jumped near our boat; but that was too common an occurrence to arouse our interest. Suddenly an apparition shot out of the deep. It was my first impression that it was a veritable 'Jabberwock with eyes of flame'; but it turned out to be nothing but a seventy-pound tarpon. It struck me on the shoulder and passing close to my head dived to the floor of the boat between my chair and the rail, a measured distance of only thirteen inches. Its next move was to break the watch on my wrist and to smash the searchlight on the chair in front of me. The boat carried a large fire extinguisher securely lashed to the shaft of the steering wheel. The fish broke this loose and tipped it over. The extinguisher, although taken by surprise, promptly went into action, thereby adding to our troubles. The tarpon then flapped its way forward, looking, as my guide afterward asserted, for some Budweiser beer which we carried in the bow. The boat was spattered with blood, scales, slime and feces. The noise made by the flopping, jumping fish and the commotion in our boat excited the mirth of everyone nearby but we could not bring ourselves to share their point of view. Finally, my guide, after wrestling with the fish awhile, threw it overboard, still fast to the hook of the angler who had struck it.

"I naturally concluded that such an experience was not likely to recur for although many tarpon had hit the boat in the past, none had ventured to remain.

"The next night I fared forth and after catching one fish, struck another. The guide promptly started the boat but the fish ran with it and leaped toward the boat. The first intimation I had of this was when it struck the starboard rail and slapped me across the back precisely as the other had done the previous night. Crossing over the stern within a foot or so of my face, it hit my reel and jammed my right hand against the rod, injuring one of my fingers. It then struck the other rail a resounding blow and vanished into the darkness. All this happened in an instant. An aching shoulder, some slime on my reel, a bruised finger and the blood on my shirt were all that remained to remind me of the visitation. On successive nights a fair-sized tarpon passed within a foot or so of my head and one fish, at least, was still attached to the angler's line. Surely the Patron Saint of all fishermen was kind to me on these occasions."

Considered from every angle, the tarpon is admittedly a preeminent gentleman of the sea, unexcelled for beauty and untouched for power. Louisiana should be proudly aware that, as set forth elsewhere in this issue of the Louisiana Conservation Review, the coastal waters of our State offer peerless tarpon fishing. Anglers throughout the country are becoming more and more aware of the opportunities Louisiana offers to the sportsman.—J. N. G.

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THE ORGAN OF EQUILIBRIUM IN FISHES

The ears of fishes are not only the seat of hearing but contain very efficient organs of orientation and equilibrium, which are even more important to them than they are to us. Because of the frequently dark or murky surroundings and the uniform appearance of water, even clear water, away from the bottom or shores, sight is of little value to a fish in helping him to orient himself.

In the ears of fishes are situated the usual three semi-circular canals, very similar in construction to those of the human ear. These are arranged in different planes so that no matter how a fish turns, the enclosed liquid, by its inertia, flows against nerve endings and enables him to orient himself. Furthermore a fish must frequently turn on the side or upsidedown while feeding or escaping from enemies, and he must do this quickly and with precision. He must also leap, or turn around quickly. Therefore accurate and automatic organs of orientation and equilibrium are vital to the very existence of fishes.

We have not only eyes to guide us about, but the strong pull of the force of gravity to help us orient ourselves with respect to up and down. A fish not only has relatively poor vision and ordinarily few landmarks, but its weight is approximately the same as that of water. Therefore, the force of gravity acting on the fish's body is of no value in helping it to balance itself. A special organ of equilibrium designed to register the force of gravity is essential.

Such an organ exists in the form of small bulb-like pieces of bone, free to roll about in the liquid of the inner ear.

◆

BUTTERFLY MIGRATIONS

When we think of migrations, we generally think of birds, but relatively few people know that butterflies migrate, sometimes in great flocks. Such a migration occurs in Louisiana at this time every year, according to Percy Viosca, Jr., consulting biologist of the Department of Conservation. It is particularly spectacular over water and along the shores of lakes, where it is difficult for fishermen not to notice it. The flocks consist chiefly of the monarch butterfly, a large brown species which can be distinguished by the way it flutters and then soars. The queen butterfly, although only a small percentage of the total, takes part in the migration.

Although monarch butterflies are absent in the Deep South during the summer months, they arrive along the Gulf Coast in numbers during October or November, about the same time the geese arrive. The southward migration seems to be made solely during intervals of northerly winds.

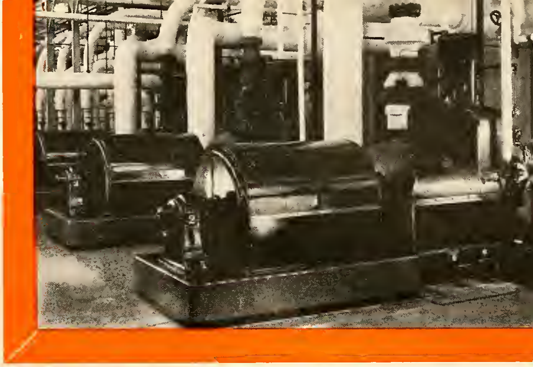
The reason why this migration is so spectacular is that the butterflies fly in flocks like birds. At night hundreds of them will roost in a single tree, so thickly that it will look like an over-decorated Christmas tree. They hang together on the side sheltered from the wind, facing the direction from which it is blowing. If a sudden drop in temperature occurs, they may remain hanging on the same tree for several days. When the weather warms up again, they will flutter away to another location further Southward.

They generally pass over Lake Michigan in early September. As they begin to arrive in New Orleans in late October, it actually takes about 55 days for them to cover a distance of 900 miles, an average rate of about 16 miles per day.

This migration is one of the great mysteries of science. It is timed by nature to occur when the golden rods, asters and other fall flowers are in bloom. As these flowers bloom earlier in the North, the insects would ordinarily have to hibernate as soon as their food supply gave out, but instead, they move Southward, firing a bounteous supply of nectar on the way.

If the weather moderates after they reach the Gulf Coast they may linger a while, even lay eggs. On one occasion, a fall crop of caterpillars was observed on a species of milkweed near New Orleans. When northerly winds blow, however, the main flight seems to keep moving toward the Gulf of Mexico over which they disappear.

POWER PLUS...



The largest power plant in the South, and one of the finest in the world, is located at Port Sulphur, Louisiana, fifty miles south of New Orleans.

This magnificent plant, which is practically automatic and fool-proof, represents a triumph of engineering skill over tremendous obstacles. Brain-racking chemical research to say nothing of millions of dollars, preceded perfection of the process of sulphur recovery and refinement by the Freeport Sulphur Company.

Out of the muck of marsh-land has risen a great industry, giving employment to hundreds of people—an ideal community life that bears out the theory that it is possible for a corporation to have the humanitarian impulse as well as "profit incentive".

A feature of this industrial plant is a modern purification system to prevent the pollution of adjacent waters by waste in the refining processes of the operation.

This great plant is symbolic of the new industrial life of Louisiana. At its base are our natural resources, the most varied and interesting of any state in the Union.

DEPARTMENT OF CONSERVATION
STATE OF LOUISIANA

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Photo by Metzger

Any Way You Look At It...

You are looking up into the "innards" of an oil derrick, one of those steel structures that have risen, phoenix-like, over the landscape of Louisiana.

Ten years ago, there was no commercial oil production in Louisana east of the Atchafalaya—to-day there are over thirty fields in southeast Louisiana.

No one dreamt of production below the 13,000-foot level ten years ago. Deeper and deeper drilling on the top and flanks of our salt domes is now producing oil from deeper and deeper formations.

This means that we must continue to revise our estimates of potential reserves in Louisiana. The real production lies in the future, not behind us.

Through its Minerals Division and Geological Survey this Department is co-operating with the oil industry in its continued development in this State.

The conservation of this great petroleum reserve, to prevent its waste and exploitation beyond the capacity of the market to absorb it at a reasonable price, will prolong its life over a period of many years.

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